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BACKGROUND PAPER

New Opportunities for U.S. Universities in Development Assistance

Agriculture, Natural Resources, and Environment

J952-74

CONGRESS OF THE UNITED STATES
OFFICE OF TECHNOLOGY ASSESSMENT

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Foreword

U.S. universities and the U.S. Agency for International Development (AID) have a long history of collaboration in development assistance, and of frustration with aspects of their relationship. Collaboration has been based on mutual recognition of the need to access the broad range of U.S. intellectual resources to help address developing country problems; the shared frustration has been based on mutually perceived shortcomings in collaborative efforts. Numerous factors contributed to U.S. university/AID conflicts, including different approaches to development assistance, differing bureaucratic styles, mistrust of each other's commitment and/or technical capabilities, and intrusion of politics into some aspects of development aid.

New opportunities for U.S. university involvement in foreign development assistance, however, are arising from new initiatives in AID and in other development assistance organizations. AID's growing emphasis on sustainable agriculture, natural resource management, and maintenance or improvement of environmental quality offers U.S. universities new areas of specialization and, thus, fresh areas of participation in development assistance. Intensifying efforts to achieve mutual benefits from development assistance for developing countries and the United States also offers U.S. universities involvement in "second generation" development projects.

In addition, AID and U.S. universities are developing new, multi-institutional collaborative relationships involving a wide sphere of U.S. universities, private sector organizations, and Federal agencies. Benefits of such expanded collaboration may include: potential for increased university participation in development assistance, economic and strategic advantages of pooling knowledge and resources and of sharing risks and costs, the possibility of garnering increased political support for university involvement in development assistance, and broadening educational opportunities for U.S. and developing country students.

The House Committees on Foreign Affairs and Science, Space and Technology requested the Office of Technology Assessment to review the constraints and opportunities to U.S. university involvement in foreign development assistance related to agriculture, natural resource management, and protection of environmental quality. The Subcommittee on International Economic Policy, Trade, Oceans, and Environment of the Senate Foreign Affairs Committee and Senator Tim Wirth supported that request. This background paper discusses the legacy of 40 years of U.S. university/AID collaboration, and examines new opportunities for U.S. university participation in development assistance.

OTA greatly appreciates the contributions of workshop participants assembled for the study, authors of contracted papers, and reviewers of draft materials. We are especially grateful for the time and effort donated by representatives of universities, private organizations, and Federal agencies who provided materials and information to keep OTA informed on the ever-changing relationship between U.S. universities and AID. As with all OTA studies, the content of the report is the sole responsibility of OTA.

John H Gibbons

JOHN H. GIBBONS
Director

Workshop Participants—U.S. Universities and Foreign Aid: Technical Assistance for Agriculture, Natural Resources, and Environment

March 23-24, 1989

Kenneth Shapiro, *Chair*
International Agricultural Programs
University of Wisconsin
Madison, WI

William Bentley
Development Studies Center Winrock International
Morrilton, AR

Nancy Blanks
The Center for PVO/University Collaboration
in Development
Western Carolina University
Cullowhee, NC

William Burch
Tropical Research Institute
Yale University
New Haven, CT

Richard Cobb
Bureau for Asia and Near East
Agency for International Development
Washington, DC

Spiros Constantinides
International Center for Marine Resources
Development
University of Rhode Island
Kingston, RI

Don Dweyer
Department of Animal and Range
Sciences
New Mexico State University
Las Cruces, NM

Francille Firebaugh
College of Human Ecology
Cornell University
Ithaca, NY

William Furtick
Bureau for Science and Technology
Agency for International Development
Washington, DC

James Henson
International Program Development
Washington State University
Pullman, WA

Lance Jepson
Bureau for Africa
Agency for International Development
Washington, DC

James Lowenthal
Bureau for Asia and Near East
Agency for International Development
Washington, DC

Lynn Pesson
Board for International Food and
Agricultural Development
Agency for International Development
Washington, DC

Hugh Popenoe
International Programs
Center for Tropical Agriculture
University of Florida
Gainesville, FL

Richard Robbins
International Agriculture Programs
North Carolina A&T State University
Greensboro, NC

Stephen Wingert
Bureau for Latin America and
the Caribbean
Agency for International Development
Washington, DC

NOTE: OTA appreciates and is grateful for the valuable assistance and thoughtful critiques provided by the workshop participants. The workshop participants do not, however, necessarily approve, disapprove, or endorse this report. OTA assumes full responsibility for the report and the accuracy of its contents.

OTA Project Staff—New Opportunities for U.S. Universities in Development Assistance: Agriculture, Natural Resources, and Environment

Roger C. Herdman, *Assistant Director, OTA*
Health and Life Sciences Division

Walter E. Parham, *Food and Renewable Resources Program Manager*

Alison L. Hess, *Project Director*[1]

Edward F. MacDonald, *Project Director*[2]

Allen Ruby, *Research Analyst*

Nina Goldman, *Research Assistant*

Alice Skelsey, *Editor*

Administrative and Support Staff

N. Ellis Lewis, *Office Administrator*

Nellie Hammond, *Administrative Secretary*

Carolyn Swann, *PC Specialist*

---

[1] From October 1990 to May 1991
[2] From October 1988 to September 1990

List of Acronyms

AID —Agency for International Development
AID/ANE —Bureau for Asia and the Near East, AID
AID/BA —Bureau for Africa, AID
AID/LAC —Bureau for Latin America and the Caribbean, AID
AID/PPC —Bureau for Program and Policy Coordination, AID
AID/RUR —Office of Research and University Relations, AID
AID/S&T —Bureau for Science and Technology, AID
ARDN —Agriculture, Rural Development, and Nutrition functional budgeting account (AID)
AUSUDIAP —Association of U.S. University Directors of International Agricultural Programs
BIFAD —Board for International Food and Agricultural Development
CGIAR —Consultative Group on International Agricultural Research
CRSP —Collaborative Research Support Program
DFA —Development Fund for Africa
ENR —Environment and Natural Resources
ESF —Economic Support Fund
HBCU —Historically Black Colleges and Universities
IAPI —International Agriculture Program Initiative
IARC —International Agricultural Research Centers
IQC —Indefinite Quantity Contract
JCARD —Joint Committee on Agricultural Research and Development
JCC —Joint Career Corps
JMOU/PSG —Joint Memorandum of Understanding/Program Support Grant
LDC —lesser developed country
MUCIA —Midwest University Consortium for International Activities
NARS —National Agriculture Research Systems
NASULGC —National Association of State Universities and Land Grant Colleges
NGO —Nongovernmental Organization
NRMS —Natural Resources Management Project
OICD —Organization for International Cooperation in Development
PVO —Private Voluntary Organization
SECID —South East Consortium for International Development
USDA —U.S. Department of Agriculture

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Highlights

U.S. universities and the U.S. Agency for International Development (AID) have had a long history of collaboration in development assistance, and of frustration with aspects of their relationship. Collaboration has been based on mutual recognition of the need to access a broad range of U.S. intellectual resources to help mitigate developing-country problems; the shared frustration has been based on mutually perceived lack of success in collaborative efforts. Numerous factors have contributed to that frustration, including different approaches to development aid (AID customarily emphasizes short-term project implementation, universities excel at long-term institution building and research), different bureaucratic styles (centralized universities v. a decentralized, hierarchical AID), distrust in each other's commitment and/or technical capabilities, and the intrusion of politics into some aspects of development aid.

U.S. university participation in AID development assistance ventures has declined since passage of the Title XII program in 1975 such that U.S. university entitlement effectively is ended. That program authorized AID to direct resources to building U.S. university capacity to support and carry out AID agriculture projects. The decline in Title XII projects is commonly attributed to:

- decline in AID involvement in large institution-building activities,
- decline in the Agriculture, Rural Development, and Nutrition budget, much of which initially was directed to U.S. agricultural university project collaboration, and earmarking of those funds for other purposes,
- growing Mission management of programs involving private sector development and marketing elements for which private sector contractors tend to be preferred, and
- growing preference by AID and host country project leadership for fully open competition in procurement of services.

Additional factors constrain increasing university involvement in development assistance through current AID/university collaborative activities. Declining international development assistance budgets are curbing AID programs in general and university involvement in particular. AID's decentralized bureaucracy, frequent policy shifts, and rapid staff turnovers hinder university involvement, whereas university tenure and reward policies are commonly incompatible with AID priorities, such as applied research. Some domestic constituents of land-grant colleges continue to resist faculty participation in foreign aid projects. Time frames are mismatched: the academic year does not conform to AID's open, flexible schedules. Perhaps the most important factors hindering U.S. university involvement in AID programs today are the new trends toward fewer projects, increased project size, and increased reliance on nonuniversity players.

New opportunities for U.S. university involvement in foreign development assistance, however, are arising from new initiatives in AID, and in other development assistance organizations. Reorganization and redirection of AID's programs was announced by AID Administrator Ronald W. Roskens in early 1991, citing concerns with the U.S. budget deficit, increasing scarcity of foreign assistance funds, and proliferating legislative objectives. The new mission is to "do fewer things, and do them very well." To achieve this, four strategic initiatives were proposed to focus AID activities:

1. *The Democracy Initiative*: "to help promote and consolidate democracy as the legitimate organizing principle for political systems throughout the world."
2. *The Partnership for Business and Development*: "to engage American private sector participation in the effort to develop and sustain free-market principles and broad-based economic growth in developing countries."
3. *Family and Development*: "to use the family . . . as a starting point for analysis of what people need, how they use the resources they have, and as an organizing principle for mobilizing the energy of people to create progress."
4. *Environment*: "to guide the Agency's environmental and natural resource interventions to areas where . . . assistance will have the greatest impact."

A new AID emphasis on sustainable agriculture, natural resource management, and maintenance or improvement of environmental quality differs from the historical focus of U.S. agricultural (land-grant) universities largely on increasing food production and, thus, offers them new areas of specialization. New efforts to achieve mutual benefits from development assistance for developing countries and the United States also open U.S. universities to involvement in "second generation" development projects that direct new assistance to lesser developed country (LDC) organizations from which AID assistance had formerly been withdrawn.

In addition, AID is focusing its affiliations with development assistance organizations, including U.S. universities, to encourage multi-institutional collaborative relationships. Benefits of collaboration include potential for increased university participation in development assistance, economic and strategic advantages of pooling knowledge and resources and of sharing risks and costs, the possibility of garnering increased political support for university involvement in development assistance, and broadening educational opportunities for U.S. and LDC students. LDCs have reacted favorably to past collaborative efforts.

U.S. universities have long collaborated with each other, commonly in university consortia. Potential exists, however, for additional collaboration among universities and between universities and other actors in development assistance community (e.g., International Agricultural Research Centers, private sector organizations). Further, U.S. universities may tap into the growing international efforts of other Federal agencies, such as those of the U.S. Department of Agriculture. Realizing the full potential for U.S. university participation in U.S. development assistance will require systematic collaboration among all those involved.

Chapter 1

Introduction

Problems of bureaucracy, distrust, and misunderstanding have beleaguered interactions between the U.S. Agency for International Development (AID) and U.S. universities since the inception of a formal partnership 40 years ago. In spite of these difficulties, some shared activities have proved successful, thus raising hopes that working relationships could be improved for both parties and that the ultimate beneficiaries—developing countries—could benefit from this relationship as originally intended. The question today is what types of relationships might encourage application of U.S. university intellectual resources to developing country problems.[1]

This report focuses on university/AID interactions in activities directly related to agriculture, natural resources, and the environment.[2] Of these three areas, agriculture has received the lion's share of attention and funding over the years. However, agriculture only recently has been recognized as one aspect of natural resource use and management. Further, those natural resources that support and underpin agriculture are components of a larger system referred to generally as the "environment." Recognition of these concepts is evidenced by expanding legislative language (see box 1-A), new AID initiatives, and by the growth in development assistance funding for natural resource and environment programs and projects.

One symptom of the strained relationship between AID and universities that periodically surfaces is the inappropriate application of science and technology to development problems. Matching technology to developing country problems in agriculture, natural resources, and the environment, and achieving the desired results is an extremely difficult task [111; see app. E], and failures commonly are highlighted in the media. However, focusing attention on flawed past development attempts probably is less constructive than addressing opportunities for expanding and improving use of university resources to support foreign development assistance efforts.

New opportunities for U.S. university participation in development assistance may be found in two major areas: expanding collaborative efforts to include organizations other than the U.S. Agency for International Development, and developing expertise in areas that support new development assistance initiatives. Still, lying behind any new endeavors will be an instructive history of problematic relationships between U.S. universities and AID.

HOW AID HAS USED UNIVERSITIES

The Agency for International Development and U.S. universities have collaborated for the past 40 years (see table 1-1), and various contractual and program mechanisms have been designed to facilitate their work together (see box 1-B). Since initiation of this collaborative association, AID efforts primarily have involved U.S. land-grant universities.

In 1975, Title XII of the Foreign Assistance Act, "Famine Prevention and Freedom from Hunger" (see app. A), focused the joint activities of AID and U.S. universities on food and agriculture—areas that universities working in development assistance traditionally emphasized. Passage of Title XII authorized long-term funding by AID to support continuing university involvement in development assistance. Title XII allowed universities increased input in assistance program planning, and promoted cooperative relationships between U.S. and developing country institutions [45].

Title XII also created the Board for International Food and Agricultural Development (BIFAD[3]), to serve as an intermediary between AID and universities. An important result of Title XII was reemphasis of U.S. university research aimed at increasing the

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[1] Information derived from an OTA workshop on U.S. Universities and Foreign Aid: Technical Assistance for Agriculture, Natural Resources, and Environment, Mar. 23 and 24, 1989, is incorporated in the text of this background paper as general information; participants have not been cited individually.

[2] For the purposes of this Background Paper, agriculture shall be defined to comprise all cropping and livestock management systems, including aquaculture, agroforestry, and forestry.

[3] Under the 1990 reorganization of AID, this organization was renamed the Board for International Food and Agricultural Development and Economic Cooperation (BIFADEC). However, it shall be referred to as BIFAD in this report.

Box 1-A—Amendments to the Foreign Assistance Act Concerning International Environmental Protection and Natural Resource Management

Congressional concern with international environmental protection has increased markedly over the last decade. U.S. foreign assistance programs began incorporating environmental concerns in the late 1970s when a series of amendments to the Foreign Assistance Act defined the Agency for International Development's (AID) mandate in the area of environment and natural resource management. These amendments gave specific emphasis to promoting efforts to halt tropical deforestation and maintain biological diversity.

1977: Amended sec. 102 to add environment and natural resources to areas AID should address.

1977: Added new sec. 118 on "Environment and Natural Resources," authorizing AID to fortify "the capacity of less developed countries to protect and manage their environment and natural resources" and to "maintain and where possible restore the land, vegetation, water, wildlife, and other resources upon which depend economic growth and well-being, especially that of the poor."

1978: Amended sec. 118, requiring AID to carry out country studies in the developing world to identify natural resource problems and institutional mechanisms to solve them.

1978/79: Amended sec. 103 to emphasize forestry assistance, acknowledging that deforestation, with its attendant species loss, constitutes an impediment to meeting basic human needs in developing countries.

1981: Amended sec. 118, making AID's environmental review regulations part of the Act, and added a subsection (d), expressing that "Congress is particularly concerned about the continuing and accelerating alteration, destruction, and loss of tropical forests in developing countries." Instructs the President to take these concerns into account in formulating policies and programs relating to bilateral and multilateral assistance and to private sector activities in the developing world.

1983: Added sec. 119, directing AID in consultation with other Federal agencies to develop a U.S. strategy on conserving biological diversity in developing countries.

1986: Redesignated sec. 118 as sec. 117 with the new sec. 118 addressing tropical forest issues. Amended sec. 119, which among other things earmarked money for biological diversity projects.

1988: Directed AID to monitor the economic and environmental soundness of multilateral development bank programs and projects.

1990: Directed AID to increase the number and expertise of staff in environmental and natural resources fields, and to focus efforts on LDCs projected to produce substantial amounts of greenhouse gases to the atmosphere.

SOURCE: Adapted in part from B. Rich and S. Schwartzmann, "The Role of Development Assistance in Maintaining Biological Diversity In-Situ in Developing Countries," contractor paper for the Office of Technology Assessment report on *Technologies To Maintain Biological Diversity*, OTA-F-330, March 1987.

world's food supply, mainly through the creation of Collaborative Research Support Programs. Today, such research remains central to university involvement in development assistance [45].

Although Title XII initially increased university activity abroad, the effect was short-lived. The program has not achieved its potential for involving U.S. universities in development assistance and for creating the type of partnership between AID and universities envisioned by the amendment's creators [118]. The majority of the work now carried out by universities for AID fits into five general areas:

1. research and technology generation,
2. extension and technology transfer,
3. education and training,
4. institution building, and
5. U.S. university capacity strengthening.

By statute and regulation Congress requires AID to monitor and report to Congress on progress toward achieving the Nation's development assistance objectives. AID spends about $11 million annually conducting about 250 evaluations, many of which relate to U.S. university performance in development assistance activities [59]. Universities themselves and outside organizations also conduct evaluations, audits, investigations, and reviews. These evaluations, however, may offer little insight into the effectiveness of university participation in development assistance activities. Few evaluations have been performed in certain areas, such as the impacts of technology transfer, extension, or training. Surveys containing the opinions of AID and university personnel account for much of the information available to AID on university relations; the most prominent of these are the 1986 "McPherson

Table 1-1—Chronology of University Involvement in International Development Assistance

Date	Activity
1800s-1940s	Individual, sporadic efforts based on personal affiliations between U.S. university personnel and colleagues abroad; numerous foreign students attend U.S. universities
1949	President Truman calls for a U.S. foreign assistance program in his inaugural address that will "make the benefits of our scientific advance and industrial progress available for the improvement and growth of underdeveloped areas"
1949	Chairman of the National Association of State Universities and Land-Grant Colleges commits the land-grant community to the program, identifying agricultural development as a primary U.S. strength and foreign development assistance need.
1950	Congress creates the "Point Four Program," administered by the Technical Cooperation Administration, thus initiating the first formal overseas development assistance program. Based on the successful Marshall Plan, the Point Four Program centered on directly transplanting U.S. technology in LDCs.
1950s	United States supports 26 alliances between universities in the United States and lesser developed countries (LDCs)
1961	Congress passes the omnibus Foreign Assistance Act (Public Law 87-195) which declares the "encouragement and sustained support of the people of developing countries in their efforts to acquire the knowledge and resources essential to development and to build the economic, political, and social institutions which will improve the quality of their lives" a principal foreign policy objective.
early 1960s	Emphasis shifts from university alliances to "institution building:" training LDC students at U.S. universities; providing U.S. university faculty to research, teach, and advise at LDC institutions; and supplying LDC institutions with materials and equipment.
1966	Congress enacts section 211(d) of the Foreign Assistance Act (Public Law 89-583) allotting $10 million for research and educational institutions to strengthen their programs ("capacity-building") concerned with economic and social development of LDCs.
1973	Congress enacts the "New Directions" amendment to the Foreign Assistance Act (Public Law 93-189), emphasizing assistance to the "poorest of the poor," and de-emphasizing the role of universities in development assistance.
1970-1975	AID-funded contracts to universities drop by 50 percent
1975	Congress creates Title XII "Famine Prevention and Freedom from Hunger" in amendments to the Foreign Assistance Act (Public Law 94-161), calling for development of a formal partnership between AID and U.S. universities in activities related to food and agriculture. The Board for International Food and Agricultural Development (BIFAD) was created to intermediate between land-grant universities and AID.
1980	AID creates the Office of Forestry, Environment, and Natural Resources.
1983	AID prepares policy determinations on "Environment and Natural Resources Aspects of Development Assistance" and releases a "Statement on Environment and Sustainable Development."
1988	AID prepares an updated policy paper on "Environment and Natural Resources" that became the basis for a new Environmental Initiative proposed under the 1990 restructuring of the agency.
1990	AID announces an agency reorganization, including creation of a Center for University Cooperation in Development administered by the Bureau for Science and Technology, that consolidates the Board for International Food and Agricultural Development and the Office of Research and University Relations. AID also defines a new mission, embodied in four development initiatives: 1) Democracy Initiative; 2) Partnership for Business and Development; 3) Family and Development, including food security; and 4) Environment Initiative.

NOTE: See U.S. House of Representatives, Committee on Foreign Affairs and U.S. Senate, Committee on Foreign Relations, "Joint Committee Print—Legislation on Foreign Relations Through 1979," February 1980, for a detailed description of the early evolution of U.S. foreign assistance legislation. For a detailed history of AID/university collaboration, see Jordahl, B., "Universities and AID: A History of Partnership and Problems in Their Collaboration to Provide Technical Assistance for Developing Countries," Master's Thesis, Universitty of Minnesota, St. Paul, MN, March 1991.

SOURCE: Office of Technology Assessment, 1991

Box 1-B—AID/U.S. University Collaboration Mechanisms

Several mechanisms have been developed over the years to bind the Agency for International Development (AID) and universities together in formal relationships. AID uses universities primarily to implement AID-designed projects, specifying in detail the activities that need to be carried out and the expected end results. Most university collaboration with AID is devoted to research and project implementation, however AID also has developed several specialized mechanisms to involve U.S. universities in other stages of AID project development.

Three central mechanisms used by AID—contracts, grants, and cooperative agreements—establish different types of obligations and contributions required of each party in the partnership. Contracts allow AID the highest degree of operational control. Grants, in theory, leave program decisions to the recipient. Cooperative agreements distribute control between both parties. The nature of an agreement between a university and AID determines to a large extent the degree of oversight provided by AID as well as the amount of freedom and flexibility allowed the university. Both factors seem to affect the level of satisfaction of AID and universities in the relationship.

Three-fourths of university business with AID occurs under the framework of contracts. Mission directors, who are under heavy accountability pressure from Congress and AID/Washington, tend to rely on these "enforceable instruments" over grants and cooperative agreements that do not necessarily provide Mission directors with the ability to enforce effective performance by universities. Mission directors also choose to work under contracts when guidelines do not deem grants or cooperative agreements the most appropriate mechanisms for carrying out the activity.

AID formalizes the remaining one-fourth of its business agreements with universities under grants and cooperative agreements. Both of these mechanisms—used mainly by AID's Bureau for Science and Technology (AID/S&T) for research services—are forms of assistance to an organization. AID/S&T directs approximately most of its agriculture funds to universities through grants, which are the main instrument used by the Collaborative Research Support Program and the programs of AID/S&T's Office of Research and University Relations. The bulk of remaining AID/S&T agricultural activities with universities is carried out under cooperative agreements.

Recipients of grants and cooperative agreements may be required to contribute a specified percentage of funding to the project to demonstrate their commitment. Cooperative agreements, however, allow AID to participate in project planning, while grants provide the recipient with more freedom in carrying out the activity and provide for minimal AID involvement.

Universities seem to prefer the relationships established under grants and cooperative agreements to those established under contracts because the former allow more flexibility and create more of a partnership or joint-ventureship between the university and AID. Grants and cooperative agreements do not place the universities

survey" [cf: 52] and recent evaluation of Program Support Grants [51].

Research and Technology Generation

Research and technology generation have played varying roles in U.S. foreign assistance programs. The Point Four program, established under President Truman, placed heavy emphasis on the United States' strength in science and technology (see table 1-1). Although through the 1960s and most of the 1970s research was not the top priority of universities working in development assistance, enactment of Title XII in 1975 reemphasized university research. Estimated AID funding for agricultural research and technology generation rose during the early 1980s, reaching a peak of nearly $200 million in 1985, and then returned to the level of the early 1980s—approximately $130 million annually [59]. AID provided nearly $50 million for research and technology development at 42 universities in 1988 (see figure 1-1).

U.S. universities have participated in research related to development assistance in several ways (see app. B). The Collaborative Research Support Program and the International Agricultural Research Centers provide forums for scientists, researchers, and graduate students from U.S. institutions to work in conjunction with other experts on global issues affecting development. AID also has generated a special collaborative program between land-grant colleges ("1862 institutions") with Historically Black Colleges and Universities ("1890 institutions"). Moreover, U.S. university faculty work on AID Mission project research, which usually entails supporting a national agricultural research organization in the host country.

in a typical business arrangement based on demands, results, and payments—an arrangement that at times seems incompatible with traditional university activities such as education and research, where timeframes can be unpredictable and results subjective.

Cooperative agreements also are not subject to the same open competition requirements that govern a contract. Federal Acquisition Regulations require that all goods and services, such as a request for technical assistance, be procured through a competitive process. Cooperative agreements, however, are governed by the Federal Grants and Cooperative Agreement Act of 1982 and Office of Management and Budget Circular 110, according them a certain degree of flexibility in competition requirements. AID requires competition to the "maximum practicable extent" for grants and cooperative agreements, but the authorized exceptions to this requirement are such that many grants and cooperative agreements are not allocated competitively [71]. This flexibility has allowed AID and universities to negotiate a significantly different type of relationship than that obtained through a contract—one that places more emphasis on partnership and focuses less on the exchange of services for funding.

Several mechanisms have been developed to involve U.S. universities in various stages of AID project development, but these are rarely used. The Board on International Food and Agricultural Development (BIFAD) promoted the Collaborative Assistance Mode of contracting to involve universities in project design as well as implementation. In the past 5 years, only 5 projects have been so designated, yet the mechanism remains BIFAD's preferred contracting method. Universities and consortia also may enter into Indefinite Quantity Contracts (IQC), instruments through which universities agree to provide an unspecific quantity of technical services up to a specific maximum dollar amount. Private firms also may compete for IQCs.

Finally, AID created the Joint Career Corps (JCC) as a means of sharing university technical expertise with Mission personnel and increasing universities' familiarity with and knowledge about AID. University personnel participating in the JCC may devote one-third of their career time to AID and two-thirds to the university by alternative 4-year stays at their home campus with 2-year AID assignments abroad. The JCC program also has provisions for a "reverse exchange" program, whereby AID personnel work at universities for specified time periods, usually 1-year assignments. Through these exchanges, AID officials would be able to share their international knowledge with the university community, reestablish their professional credentials, and broaden their areas of expertise. Despite its popularity with AID employees, the JCC program has been little promoted and has generated no long-term relationships [25].

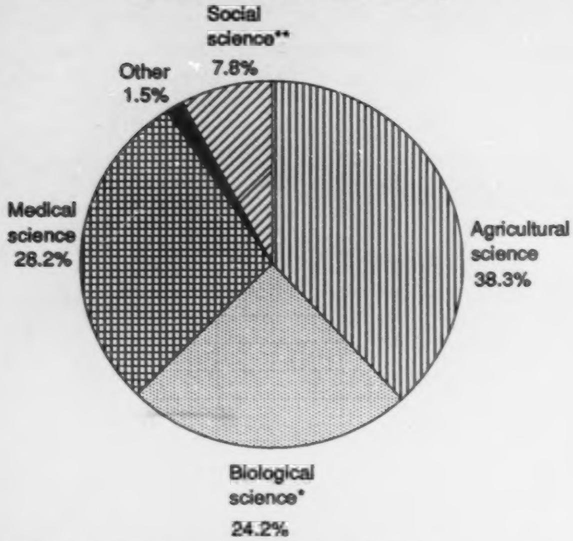
SOURCE: Unless otherwise noted, adapted from John G. Stovall, "The Role of U.S. Universities in Development Assistance: What Have We Learned from Experience?" contractor report prepared for the Office of Technology Assessment, August 1989.

AID Bureau for Science & Technology has focused support in recent years for creating "centers of excellence": strengthening a U.S. university department or institute linked to particular subject areas or geographical regions. These commonly consisted of cooperative agreements with universities for a core research program and provision for Missions to draw on university expertise as needed for technical services in specialized areas such as seed technology, aquaculture, post-harvest technology, land tenure, and food security [59]. Some of these U.S. university centers of excellence have become world-reknowned in their specialties, playing an important role in acquiring, assimilating, and analyzing knowledge from around the world and integrating this information into solutions for developing societies' problems. As such, they are unique components of the U.S. and international development assistance community.

A growing number of organizations outside the university community also have developed strong research programs relevant to development assistance. While responses to the 1986 McPherson survey revealed a positive perception among Mission Directors of U.S. universities' work in research, a large number of respondants indicated that the International Agricultural Research Centers (IARCs) were at least equal to U.S. universities in conducting research [52]. Private firms and research institutes (e.g., Appropriate Technology International) also have developed far-reaching research programs.

AID environment and natural resource activities have focused more on field-project implementation than on research and institution-building and, therefore, have not meshed as well with U.S. university strengths. Individual university scientists have conducted most of their developing country environ-

Figure 1-1—AID Supported R&D at U.S. Universities by Field of Study, Fiscal Year 1988 (Total funding = $48.454 million at 42 universities)



*Includes Biological Science and Environmental Biology.
**Includes Social Science, Sociology, and Economics

SOURCE: National Science Foundation, "Federal Support to Universities, Colleges, and Select Non-Profit Institutions: FY 1988," NSF 89-325 (Washington, DC: 1989).

mental research under the auspices of non-AID organizations, such as the National Science Foundation, Smithsonian, World Wildlife Fund, and Missouri Botanical Gardens. Recently, however, AID and universities have shown increasing interest in research on environmental and natural resource issues, potentially expanding opportunities for university involvement in research and technology generation for development assistance [cf: 62].

Extension and Technology Transfer

Attempts to translate the U.S. land-grant university extension system model to lesser developed countries (LDCs) have met with numerous difficulties [59]. AID's support of land-grant style extension services has declined over the past two decades because of disappointing results, a desire for rapid payoffs, and the high costs of supporting large extension systems. One AID budget data analysis shows obligations for such extension projects declining from $113 million in 1979 to $18 million in 1989—an 84 percent drop in one decade [96]. Fewer than 10 current university projects (8 percent of all current university projects) involve direct AID support to public sector extension services.

AID has relied on an eclectic approach to technology transfer since the early 1980s, involving the private sector, mass media communications, and "innovative approaches to public extension." Although AID has given increased attention to technology transfer activities, expanding their funding from $152 million in 1984 to $218 million in 1989, university participation in these types of projects is minimal [59]. AID commonly hires nonuniversity contractors, including private voluntary organizations, to carry out technology transfer projects.[4]

Education and Training

A major emphasis of U.S. university participation in international development assistance has been training and educating LDC students. Approximately 200,000 LDC students today attend about 2,000 U.S. universities [20]. The preferred fields of study for foreign students attending U.S. universities in descending order are:

1. engineering,
2. business management,
3. natural and life sciences,
4. social sciences,
5. humanities, and
6. agriculture [1].

Only 2.8 percent of the 326,300 foreign students attending U.S. universities in the 1981-82 academic year were enrolled in agricultural programs [6]. The percentage of AID-supported students enrolled in agriculture and natural resource programs is significantly higher, reaching approximately 30 percent in 1988 [103].

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[4] A recent AID review identifies general weaknesses in AID's extension activities:

- few innovative and creative extension activities in LDCs and a general overdependence on outdated extension methods,
- lack of contact with LDC farmers and few attempts to work through farmer organizations,
- insufficient contact between extension actors and research organizations,
- failure in tying extension activities to the overall development strategies of the LDCs,
- little practical technology to offer LDC farmers, and
- disregard for the significance of women's roles in extension.

Recommendations from reviewers include: improving communications, coordination, and cooperation among researchers and farmers; improving the mix of extension methods and complementing traditional one-on-one extension agent/farmer contacts; and organizing farmers to help themselves through various organizations in which farmers participate [13].

U.S. universities participate in training LDC students through several arrangements. Most foreign students are supported by personal funds, university assistantships, and other such arrangements. Some students enroll in U.S. universities as a part of an AID project, others do so with AID financial support. For example, Collaborative Research Support Programs (CRSP) provide graduate training for LDC scientists in fields related to their area of research. The Sorghum and Millet CRSP provided 77 foreign students with advanced degree training in areas related to research of those crops over a 4-year period [59].

Although the effectiveness of LDC student education and training has not been determined, universities generally are credited with contributing significantly to building up the technical and research capacity of many LDCs. Thus, the AID Mission practice of separating training components from technical components in projects, and AID's increased reliance on private contractors for student placements, have emerged as significant points of contention between U.S. universities and AID.

A recurring criticism of AID/university education and training focuses on the relevance of the material taught [cf: 16]. To improve the relevance of U.S. training of LDC students, thesis research might be conducted in the home country, preferably in conjunction with specific development projects in the home countries [59]. In addition, education and training programs could emphasize training in operating and modifying tools and techniques to complement LDC conditions. Such programs should view farming systems research and development in the context of small farm size, farm enterprise diversity, inclement agroecological conditions, and scarce or costly inputs [16]. Other recommendations for improving training and education programs include: eliminating institutional barriers that hinder LDC student performance, such as inadequate advising programs and inflexible curricula, and increasing the enrollment of women from LDCs in U.S. university programs [20]. Regular evaluations of foreign student education and training programs could lead to improved curricula and opportunities and help justify the funds invested in their training.

LDC Institution Building

One major task of U.S. universities working in development assistance has been to help develop higher education and research institutions in developing countries. Key elements of institution building include: modernization of curricula, development of research programs, creation of extension activities, and training of new and current faculty.

Institution-building is a long-term process: training and developing a critical mass of faculty can take 10 to 15 years, and developing effective research programs can take an additional 10 years. Long-term collaborations in institution building have been formed by linking a U.S. university or university consortium with one or more LDC universities, a government ministry, or a research institute in a developing nation (see table 1-2). Development of these "twinning" or "sister university" relationships have facilitated faculty exchange, training, and other AID-financed support.

One of the largest institution-building projects, and in quantitative terms perhaps one of the most successful, linked six U.S. universities to nine State agricultural universities in India beginning in 1952. AID spent $31 million over a 20-year period on this project, which provided at least 1,000 U.S.-trained Indian students with advanced degrees and sent 337 U.S. faculty members to serve at Indian institutions. A 1974 evaluation of the India project found that the number of Indian staff members with Ph.D.s at participating universities increased from 251 to 1,234, the number of professors granted advanced degrees from U.S. universities increased from 140 to 486, and enrollments at the participating Indian universities more than doubled, rising from 9,790 to 23,213 [45]. The study also revealed that comparatively little progress had been made at unassisted Indian universities over the same period.

LDC institution building through institutional linkages commonly is perceived to be U.S. universities' strongest achievement [cf: 51,52]. However, surveys have revealed an AID preference to use private firms to assist in private sector institution-building activities, and private voluntary organizations for local level institution building (e.g., cooperatives and grassroots organizations).

A 1989 study by AID's Center for Development Information and Evaluation included examples of U.S. university efforts in institution building activi-

Table 1-2—AID-Supported U.S. University and Host Country Organization Agricultural Institution Building Projects Initiated Since 1950

Host university	U.S. university	Dates
Karaj College (Iran)	Utah State University	1951-58
Agricultural College at Aba-Ghraib (Iraq)	University of Arizona	1951-59
National Institute of Agriculture (Panama)	University of Arkansas	1951-57
University of The Philippines	Cornell University	1952-65
Alemaya University of Agriculture (Ethiopia)	Oklahoma State University	1952-68
Kasesart University (Thailand)	Oregon State University	1954-60
	University of Hawaii	1962-65
Seoul National University (Korea)	University of Minnesota	1954-62
Kabul University (Afghanistan)	University of Wyoming	1954-57
Ataturk University (Turkey)	University of Nebraska	1954-57
University of Concepcion (Chile)	University of California	1954-57
University of Quito and Guayaquil (Ecuador)	University of Idaho	1954-57
Superior Institute of Agriculture (Mexico)	Texas A&M University	1954-56
National Agrarian University (Peru)	North Carolina State University	1954-68 1982-88
Hariyana Agricultural University (India)	Ohio State University	1955-72
University of Udaipur (India)	Ohio State University	1955-72
G.P. Pant Agricultural University (India)	University of Illinois	1955-72
Andhra Pradesh Agricultural University (India)	Kansas State University	1956-72
Mysore Agricultural University, Bangalore (India)	University of Tennessee	1957-72
Orissa University of Agriculture (India)	University of Missouri	1957-72
Bandung Institute of Agriculture (Indonesia)	University of Kentucky	1957-67
	MUCIA	1969-81
	University of Wisconsin	1980-85
Hokkaido University (Japan)	University of Massachusets	1957-61
University of San Carlos (Guatemala)	University of Kentucky	1957-63
Peshawar University (Pakistan)	Colorado State University	1958-64
Bangladesh Agricultural University	Texas A&M University	1958-73
Hebrew University (Israel)	State University of New York	1958-62
National College of Agriculture (Cambodia)	University of Georgia	1960-63
National Taiwan University	Michigan State University	1960-64
Chung Hsing University (Taiwan)	Michigan State University	1960-64
University of Nigeria	Michigan State University	1960-67
National College of Agriculture (Vietnam)	University of Georgia	1960-63
National University of Asuncion (Paraguay)	Montana State University	1960-63
	New Mexico State University	1964-67
Punjab University (Pakistan)	Washington State University	1961-69
Universidad de la Republica (Uruguay)	Iowa State University	1962-68
Egerton Agricultural College (Kenya)	West Virginia University	1962-72
Sokoine University of Agriculture (Tanzania)	West Virgina University	1962-72
University of Ceara (Brazil)	University of Arizona	1964-73
University of San Paulo (Brazil)	Ohio State University	1964-73
University of Rio Grande do Sul (Brazil)	University of Wisconsin	1964-73
University of Vicosa (Brazil)	Purdue University	1964-73
University of Costa Rica	University of Florida	1965-70

ties in 23 countries representing each major developing country region [32]. This assessment found that a majority of LDC faculty trained by U.S. institutions returned to their host countries and emerged as university leaders, development of LDC undergraduate training programs led to a considerably expanded supply of trained agriculturalists, and many LDC universities have been able to develop new technologies for the agricultural sector.

Weaknesses in the institution-building process also were identified, among them: overproduction of manpower in LDCs in areas without sufficient jobs to support the graduates; an insufficient LDC university role in extension practices; a tendency for social science programs to lag behind agricultural and other scientific fields; and a tendency to sever institutional support prematurely. In addition, the study recognized that LDC institutions need to form close linkages with ministries of agriculture in the developing countries and must cultivate political and financial support from farm groups, agricultural firms, and other local organizations [32,59].

Table 1-2—Continued

Host university	U.S. university	Dates
Superior Institute of Agriculture (Dominican Republic)	Texas A&M University	1965-73
Punjab Agricultural University (India)	Ohio State University	1955-72
Makerere University (Uganda)	West Virginia University	1964-73
	Ohio State University	1984-93
Ahmadu Bello University (Nigeria)	Kansas State University	1962-78
University of Ife (Nigeria)	University of Wisconsin	1964-75
Bunda College of Agriculture (Malawi)	University of Massachusets	1963-70
Njala Agricultural University (Sierra Leone)	University of Illinois	1963-71
Madhya Pradesh Agricultural University (India)	University of Illinois	1964-73
Maharashtra Agricultural University (India)	Pennsylvania State University	1967-72
Institute of Agricultural and Veterinary Sciences (Morocco)	University of Minnesota	1969-90
Brazilian Agricultural Faculties	Michigan State University	1973-78
University of Jordan University	Washington State University	1975-79
Peredenia University (Sri Lanka)	Penn State/Texas A&M	1979-85
Eastern Regional Universities (Indonesia)	Washington State University	1980-85
Western Regional Universities (Indonesia)	University of Kentucky	1980-90
Visayas College of Agriculture (Philippines)	Cornell University	1981-87
Agriculture University at Dschang (Cameroon)	University of Florida	1982-90
Northwest Frontier Agri. University (Pakistan)	University of Illinois	1983-92
University of Ouagadougou (Burkina Faso)	University of Georgia	1983-90
University of Zimbabwe	Michigan State University	1984-89
University of Sanaa (Yemen)	Oregon State University	1985-96
Jamaica College of Agriculture	Louisiana State University	1986-90
School of Agriculture for Tropics Humid Regions (Costa Rica)	California Polytechnic and State University	1986-88
	Rutgers University	1986-88
	University of Nebraska	1986-88
	Virginia Polytechnic Academy of Educational Development	1986-88
Edgerton Agricultural College (Kenya)	University of Illinois	1986-91

SOURCE: G.E. Hansen, "AID Evaluation Highlights—The Impact of Investments on Agricultural Higher Education," prepared for the U.S. Agency for International Development, Washington, DC, 1989.

Capacity Building of U.S. Universities

Since the enactment of 211(d) of the Foreign Assistance Act in 1966, AID has formally attempted to strengthen the capacity of U.S. universities working in international development. The 211(d) grants initially provided funds to improve university competence across a broad spectrum of areas, but over the following two decades the capacity-building program became more focused. Evolution of the 211(d) program into the Strengthening Grant Program and, in the mid-1980s, into the Program Support Grant/Joint Memorandum of Understanding project (PSG/JMOU) presaged a new approach to strengthening U.S. universities. AID provided approximately $26 million to some 57 U.S. universities between 1979 and 1986 under the Title XII Strengthening Grants program. Subsequent to criticism that funds were allocated to uses only peripherally related to AID objectives and activities, the successor PSG/JMOU program focused funding on U.S. university capabilities in certain specific geographic and subject areas to develop expertise related to one or more specific AID projects.

Through the Joint Memorandum of Understanding, partnerships formed between 12 land-grant universities that had "graduated" from the terminated Strengthening Grants program, and 12 Historically Black Colleges and Universities (HBCU). Each university then became eligible for a 5-year Program Support Grant to develop faculty skills. Receiving a PSG did not guarantee receipt of AID contracts, it only assisted universities' to develop capabilities for AID work.

The PSG/JMOU program was terminated in 1991 subsequent to a determination that it not a cost-effective means to involve U.S. universities with AID programs [51]. The evaluation report recommended, instead, that AID:

Table 1-3—AID/University Programs and Projects by Development Sector, Region, and Amount Cumulative, 1960-88

Region	Number of projects	Number of universities	Total dollar amount
Agriculture			
Africa	57	34	139,898,662
Asia	79	41	114,235,549
Latin America	71	24	89,815,845
North Africa/Near East	25	16	58,243,986
Total	232	115	402,194,042
Development Planning and Economics			
Africa	11	10	8,450,653
Asia	11	8	14,978,914
Latin America	21	15	14,317,723
North Africa/Near East	3	3	13,359,717
Total	46	36	51,107,007
Health and Population			
Africa	20	12	33,682,323
Asia	16	12	12,284,076
Latin America	23	16	6,328,577
North Africa/Near East	5	5	2,049,119
Total	64	45	54,544,095
Human Resources			
Africa	54	29	108,088,834
Asia	40	24	61,101,544
Latin America	56	28	26,795,932
North Africa/Near East	20	15	55,043,890
Total	170	96	251,030,200
Natural Resources			
All	10	8	14,325,437
Sciences and Engineering			
All	37	22	57,860,557
Total	559	322	831,062,338

SOURCE: E.J. Long and F. Campbell, "Reflections on the Role of AID and the U.S. Universities in International Agricultural Development" (Rockville, MD: Statistica, Inc., 1989).

1. encourage noncontractual, long-term linkages between U.S. universities and LDC institutions,
2. finance university services through contracts or individually tailored grants (with the exception of certain "strengthening elements" for HBCUs),
3. open AID use of university services to a wider range of universities, and
4. encourage collaboration between U.S. universities and the private sector.

RECENT TRENDS IN AID/ UNIVERSITY COLLABORATION

Agricultural development assistance has been the focus of U.S. university involvement in development assistance from the start and continues to account for most university development assistance work (table 1-3). At least half of Mission-sponsored university contracts since 1960 have been agriculturally oriented.[5]

AID conducts and sponsors environment and natural resources related activities, but these have been minor foci of U.S. land-grant university activity [cf: 109], even at a time of rapidly increasing national and international attention to these issues. They inevitably have been overshadowed by agricultural production activities. Increased attention to natural resource and environment in foreign assistance policy and programs suggests that these areas could figure more prominently in future U.S. university work.

University development assistance activities, however, have declined as a whole. A review of AID

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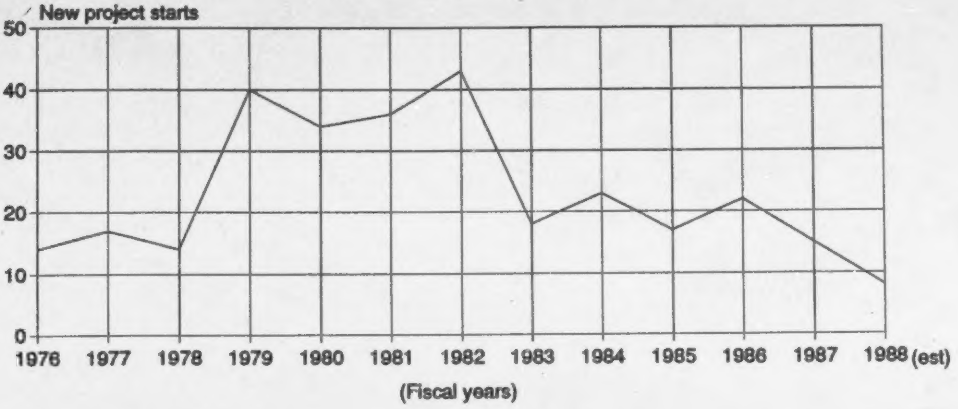
[5] Human Resources have also been an important area representing almost one-third of these university contracts. University sectoral support in development planning and economics, health and population, and science and engineering have been supported to some extent but will not be reviewed in this report.

Figure 1-2—Title XII-Type Projects by Year of Start



Projects include those involving Title XII-eligible institutions, whether procured through "set-asides" or open competition.

SOURCE: U.S. Congress, General Accounting Office, "Foreign Aid: Issues Concerning U.S. University Participation," GAO/NSAID-89-38, report to the Chairman, Committee on Foreign Affairs, House of Representatives, U.S. Congress, Washington, DC, April 1989.

Mission-sponsored university agricultural projects between 1951 and 1988 shows that such activities are now at their lowest level in 37 years [41]. A 1989 General Accounting Office (GAO) audit of Title XII activities reports that, after the 1975 enactment of the Title XII legislation, the number and dollar value of new Title XII contracts and grants for technical assistance grew, peaked in 1982, and subsequently declined (see figure 1-2).[6] Centrally funded AID/university programs, such as the Collaborative Research Support Programs (CRSPs) also have declined, concomitant with overall reductions in AID Agriculture, Rural Development, and Nutrition budgets.

The number of active projects and the number of universities involved will probably continue to fall. Universities implemented 96 new projects from fiscal year 1979 through fiscal year 1981, with a total value of $513 million—an average of $171 million annually. New university projects totaled 12 for fiscal year 1987 through fiscal year 1989, with an annual average value of $47 million. University projects represented 19 percent of the total AID obligations for all agricultural projects from 1979 to 1981, but only 4 percent from 1987 to 1989 [59].

The decline in Title XII projects is commonly attributed to four causes:

1. decline in AID involvement in large institution-building activities,
2. decline in the Agriculture, Rural Development, and Nutrition budget and earmarking of those funds for other purposes,
3. growing Mission management of programs involving private sector development and marketing elements for which private sector contractors tend to be preferred, and
4. preference by "AID managers and host country project leadership for fully open competition in procurement of services and strong resistance to 'set-asides' " [51].

Almost 75 percent of active projects terminated by the end of fiscal year 1990. The number of universities implementing Title XII projects drops with the number of active projects. In 1988, 72 universities were participating in Title XII contracts or cooperative agreements. The GAO estimates that the number may drop to 35 universities after fiscal year 1990 [106].[7]

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[6] Neither AID nor BIFAD adopted an official definition of a "Title XII project." The term is sometimes used to refer to projects that are "set aside" for Title XII universities. At other times all agricultural projects awarded to universities are referred to as Title XII projects, regardless of the contracting mode. The GAO used an unofficial list of projects maintained by BIFAD staff that includes all "Title XII-type" projects implemented by universities.

[7] These figures do not take into account university participation in non-Title XII type projects and contracts, such as in health and engineering [33].

Chapter 2

Trends in AID Policies, Programs, and Funds

The U.S. Agency for International Development (AID) is the primary Federal agency in international development assistance and the focus for university involvement in such assistance. Thus, directions taken by the agency will influence, to a large degree, the level and areas of future university participation. Existing agency and regional bureau policies and strategies, as well as funding and program trends, have significant implications for future university involvement in AID-supported technical assistance.

AID STRATEGIES FOR AGRICULTURE, NATURAL RESOURCES, AND ENVIRONMENT

AID has a range of agency and bureau strategies and policies that help define the ways the agency expects to achieve development goals. These strategies may not specify programs or projects, but they have a strong indirect impact on program and project development. They can:

- consolidate AID support for a specific area of assistance,
- influence Mission Country Development Strategy Statements,
- stimulate Missions to develop projects relevant to the strategy,
- help in review of ongoing or proposed projects, and
- establish funding targets.

The following section outlines the agricultural, natural resources, and environment strategies for the Agency overall, as well as for each of four bureaus that work most directly with universities in the provision of technical assistance. The Bureaus include: Bureau for Latin America and the Caribbean, Bureau for Asia and the Near East, Bureau for Africa, and Bureau for Science and Technology.[1] The latter plays perhaps the most prominent role in university involvement in technical assistance.

General AID Strategies

AID's development strategy today emphasizes national economic growth based on the free market and development of the private sector. In part, this strategy is based on the view that developing countries commonly have overemphasized the role of the public sector and restricted the role of the private sector to the detriment of the LDC economy and development.

In the 1980s, AID established four components or "pillars of development" for supporting economic growth through development assistance:

- policy dialogue and reform;
- private sector development;
- institutional development; and
- technology research, development, and transfer.

AID established three goals for agricultural assistance: 1) enable countries to become food self-reliant, 2) ensure the food security of their populations, and 3) contribute to broadly based economic growth. These goals were to be reached through approaches based on the "four pillars" of development [98,105]. An additional agricultural goal—commitment to natural resource and environmental maintenance and enhancement—was added under the 1987 agricultural focus statement [72], nearly 20 years after recognition of the importance of maintaining environmental quality by the U.S. Government.

Reorganization and redirection of AID's programs was announced by AID Administrator Ronald W. Roskens in early 1991, citing concerns with the U.S. budget deficit, increasing scarcity of foreign assistance funds, and proliferating legislative objectives.

> The much-amended Foreign Assistance Act (FAA) of 1961, with its 30-plus objectives for U.S. assistance, should be recast. It is simply too diverse in its directions to provide a manageable framework for assistance in the current and future environment [55].

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[1] Regional Bureau names and missions were changed in AID's 1990 reorganization just prior to publication of this document. The new regional Bureaus are: Bureau for Africa, Bureau for Europe and the Near East, Bureau for Latin America and the Caribbean, and the Bureau for Asia, Private Enterprise, and Housing.

The new mission is to "do fewer things, and do them very well" [63]. To achieve this, four strategic initiatives have been proposed to focus AID activities [64,65,66,67], and funds will be allocated on the basis of progress toward democratization, progress in economic reforms, and establishment of a market-oriented economy [64]. While a blend of project and nonproject assistance will continue, increasing weight will be devoted to economic and democratic policy reform and dialogue.

Mutual benefits—for LDCs and the United States—are a prominent focus of the new initiatives: the overall goal of AID is now to "administer economic assistance programs that combine an American tradition of international concern and generosity with the active promotion of America's national interest." As such, four new "pillars" of development assistance have been defined:

- *The Democracy Initiative*: "to help promote and consolidate democracy as the legitimate organizing principle for political systems throughout the world," [64]
- *The Partnership for Business and Development*: "to engage American private sector participation in the effort to develop and sustain free-market principles and broad-based economic growth in developing countries," [65]
- *Family and Development*: "to use the family. . .as a starting point for analysis of what people need, how they use the resources they have, and as an organizing principle for mobilizing the energy of people to create progress," [66] and
- *Environment*: "to guide the Agency's environmental and natural resource interventions to areas where. . .assistance will have the greatest impact" [67].

Agriculture

Agriculture is addressed in large part under the Family and Development Initiative:

> Food production is a family enterprise. . . . Family land and labor determine agricultural productivity, and the way in which the land and labor are used affects the natural resource base. . . . Understanding and appreciating the contribution that families make to a farm-system agricultural approach [and] to encouraging the use of safe, clean water. . .can be the factor that spells success for a development project or program [66].

Activities that AID plans to emphasize in its Family and Development Initiative include:

- consideration of LDC family food security goals, strategies, and constraints in formulating development policies;
- "supporting the family's role in coping with or balancing the often competing needs for economic productivity and sound management of natural resources;"
- designing development activities based on studies of resource allocation within families and the impact on individual members (e.g., the impact of cash cropping on the nutritional status of various family members); and
- investigation of the relationship between environmental problems and family stability, "including the short-term potentially negative impact on families' access to food and fuel resulting from long-term measures to protect the environment." [66].

Environment and Natural Resources

Although stewardship of natural resources is mentioned in several new AID Initiatives, primary attention is given to environment and natural resource issues in the new Environment Initiative. Under this initiative, AID is expanding its environmental activities given encouragement by "the Congress, the Administration, a vocal environmental NGO [nongovernmental organization] community, and by a growing number of developing countries" [62]. AID projects total environmental obligations to grow from $408 million in fiscal year 1990 to $460 million in fiscal year 1992, and a method of tracking these obligations currently is under development. Each bureau has been directed to devote 75 percent of all new environmental resources to:

1. assistance in developing sound economic and environmental policies;
2. strengthening host country environmental institutions; and
3. projects related to priority environmental problems areas in each region.

Regional problems areas identified are: loss of tropical forests, loss of biological diversity, unsound agricultural practices, poor management of coastal resources, poor management of watersheds, inefficient use of energy, and urban and industrial pollution. These problem areas show remarkable similarity across regions; all three regional bureaus list tropical forests, biological diversity, and aspects of sustainable agriculture as priority environmental problem areas.

AID's Environment Initiative is based on a 1988 Policy Paper on Environment and Natural Resources that identifies three program areas for AID support: sustainable production (including sustainable agriculture), maintenance of natural ecosystems, and improving environmental quality for human health needs [97]. Since the early 1980s, AID focused projects on management of natural resources, to aid the small-scale farmer growing food crops on poor farmland and to limit loss of tropical forests and hillside erosion. Support for this work has included development and dissemination of technologies to increase agricultural production while reducing degradation of land (e.g., agroforestry), improved management of natural forests, and support for natural resource management education at regional education and training centers.

Roles for universities are cited in many of AID's direction-setting documents: participation in research, developing human resources through education and training, institution building, and provision of technical assistance [74,75,79,82,98]. Whereas AID strategy recognizes a substantial role for the type of work that universities have traditionally carried out, concerns exist that this work has received a disproportionately small share of AID's funding. For example, the Board for International Food and Agricultural Development (BIFAD) Budget Panel has argued that "programming guidance" sent by AID to its Missions emphasized policy reform and private sector development while virtually ignoring institution building and technology generation [84].

Under the new organization and directions, entitlements to specific types of organizations seem effectively over, and matching commitments—in initiatives, in staff, and in funds, are expected:

> [AID's] work is becoming a cluster of partnerships with recipient countries, with other donors, with many U.S. Federal and State agencies, and with the American private sector. . . . In the future we will not be working with recipient countries but with partner countries. We will not use various private sector entities as agents, but enroll the energies of private voluntary agencies, universities and profit-making enterprises in the development challenge [55].

In turn, these organizations will be encouraged by AID to develop linkages among themselves (see box 2-A).

AID Regional Bureau Strategies

Each of AID's three regional bureaus has established different development objectives for its region and, thus, has different implications for university collaboration in development assistance. Regional bureaus have varying foci in line with their strategies (see app. C). The Bureau for Africa concentrates on private sector support as part of its policy reform strategy. Technology development, technology transfer, and construction receive less emphasis. The Bureau for Asia and Near East focuses primarily on construction, credit, technology transfer, and private sector support. The Bureau for Latin America and Caribbean focuses on credit, marketing, technology transfer, construction, and export promotion as part of its strategies in nontraditional exports and private sector development.

Bureau for Science & Technology

Prior to the recent reorganization and mission redefinition, the Bureau for Science and Technology (AID/S&T) identified two primary functions: to encourage research, development, and use of new technology to promote LDC economic development; and to plan and carry out scientific activities that are more efficiently conducted by a centralized organization or that are outside the capacity of an individual Mission. Such activities have included [99]:

- basic and applied research to develop new or improved technology that is not location-specific;
- research and development of new and improved technology conducted in the LDC in collaboration with the host country, Mission, regional bureau, or other donor; and
- technical field support for Mission projects.

AID/S&T identified five priority problem areas for its work: inadequate income growth, hunger, health deficiency, illiteracy and inadequate education, and unmanageable population pressure. At least two-thirds of the Bureau's resources were directed to the latter two problem areas in 1989;

Box 2-A—The Role of U.S. Universities Under the New AID Mission

Competitiveness Through Universities

AID's goal is to assist the movement in U.S. universities toward internationalization by developing partnerships between academic institutions in the United States and in developing countries.

The non-profit sector, particularly U.S. universities, can contribute as significantly as U.S. corporations to the long-term competitiveness of the United States in the world of the 1990s. The broad, historic engagement of U.S. centers of intellectual excellence with the world at large has positioned them well if a sustained effort is made. The influence of American scientists on the disciplines, the role of English as a universal language of intellectuals and scientists, and the continuing innovation pursued by U.S. institutions all create favorable conditions. But universities of other countries can now see the opportunities created by the U.S. precedent. The global playing field will be a crowded one, so U.S. institutions will not be able to rest on past glory.

For AID, the health and vigor of U.S. universities are of great importance as well. To respond to new challenges, AID needs new ideas and technologies. As the core cadre of scientists and technologists in AID declines, the need for strong, healthy linkages with the university sector grows. But the need is not simply for linkages between AID and U.S. universities. They, in turn, need to be linked with U.S corporations active in developing countries. And over the long term, strong support for the development process will come from linkages between U.S. universities and counterpart institutions in developing countries. The transfer of technical knowledge essential for development, both in terms of hardware as well as training key developing country nationals, is a multiyear process where AID can best facilitate the process. AID has extensive experience in this regard in the agricultural sector. It is now time to extend that comprehensive effort to other sectors: natural resources and the environment, health and family planning, enterprise management, and the management of increasingly free-enterprise economies. The universe of U.S. universities, already embarked on increasing internationalization, can work more closely with AID.

No longer can AID afford exclusive, entitlement-style relations with U.S. universities. We need to create processes that are inclusive and competitive, able to adapt to rapidly changing times and requirements, and to grow with the dynamic change occurring in the developing countries. AID will focus on two mechanisms for this activity:

(A) Creation of the Center for University Cooperation in Development. This center will serve to build, promote, and strengthen mutually beneficial development cooperation and partnerships among AID, U.S. institutions of higher education and their counterpart institutions in developing countries.

(B) Creation of ties between schools of business and management in the United States and in developing countries. These linkages well be permissable within the center described in Proposal A but may be desirable on a broader scale than developed in the center. The linkages could involve students, faculty and research projects.

SOURCE: Excerpted from U.S. Agency for International Development, "The Partnership for Business and Development—One of a Series of Initiatives of the U.S. Agency for International Development," December 1990.

agricultural activities made up approximately one-fourth of AID/S&T's appropriations [68].

Agriculture activities have been carried out by several offices in AID/S&T. The Office of Agriculture is the primary funding source for agricultural activities, supplying approximately 50 percent of the funds allocated to the Agriculture, Rural Development, and Nutrition (ARDN) account. Nearly one-third of the Office of Agriculture's projects focused on soil and water management for agriculture between 1977 and 1988 (table 2-1). Other offices carrying out ARDN-type work have included: Nutrition, Forestry and Environment and Natural Resources, Energy, and Rural and Institutional Development.

The AID/S&T Office of Agriculture established three primary responsibilities in 1989: 1) managing the U.S. core contribution to the International Agricultural Research Centers (IARCs), 2) overseeing the Collaborative Research Support Programs (CRSPs) that operate semi-autonomously, both technically and administratively, and 3) projects directly managed by AID/S&T through contracts and cooperative agreements. Over time the CRSPs have become increasingly important components of the Office's work and, in 1988, received 46 percent of its obligations [101].

The Office of Agriculture has one of the closest relationships with U.S. universities of any office within AID. In its purpose, its emphasis on research and technology development, and the academic

Table 2-1—Project Portfolio Categories of Office of Agriculture's Activities, 1977-88

Category	Percentage of project portfolio
Soil and water management (primarily soils and fertilizer)	30
Crop production (primarily sorghum/millet and beans/cowpeas)	26
Livestock production and health	12
Economic planning and policy	8
Fisheries and aquaculture	7
Biotechnology	6
Pest management	6
Reducing post-harvest losses, storage and utilization	4

SOURCE: U.S. Agency for International Development, Bureau for Science and Technology, Office of Agriculture, "Statistical Overview of S&T/AGR Project Portfolio FY 77–FY 88," 1989.

background of its personnel, it is similar to the agricultural universities and therefore collaboration is facilitated. The Title XII mandate, and its precursors, strengthened these ties, particularly through the CRSP program. The majority of the Office's non-CRSP projects are also with universities.

AID/S&T does not seem to suffer disillusionment with AID/university relationships as do AID Missions and regional bureaus. This is reflected in the consolidation of the Board for International Food and Development support staff and the Office of Research and University Relations into the Center for University Cooperation in Development within AID/S&T. The goal of this consolidation is to "develop programs which optimize the contributions of U.S. universities" to achievement of AID goals [56]. Most domestic funding for agricultural and natural resources research currently is directed at nonland-grant universities and private organizations [108]. Thus, the future of AID/S&T's relations with universities is likely to be concerned more with expanding access to nonland-grant schools as priorities change and with preventing budget cuts from straining existing university work, than with the current debate over the extent to which universities should be favored in development assistance.

TRENDS IN AID FUNDING AND PROGRAMS

In conjunction with its agency and bureau strategies, AID's choice of program emphases and allocation of funds among the resulting initiatives illustrate its commitment to agriculture, natural resources, and environmental programs and projects. This commitment and the choices it inspires will affect the type and extent of AID/university relationships.

Funding Trends

Funding data can help show AID's direction and trends in agricultural development and environment and natural resource activities. Budgetary constraints have affected the international development program as a whole, and university involvement in particular. In fiscal year 1989, the U.S. Government allocated $15.1 billion in foreign assistance funds to developing nations, down from a peak of $22.6 billion in fiscal year 1979 [114].

Not only has AID's overall budget decreased, but so has the Agriculture, Rural Development and Nutrition (ARDN) budget, which accounts for the majority of university funding. Since its creation in 1973, the ARDN account has been a significant component of development assistance and, as such, an indicator of AID's commitment to agricultural, natural resource, and environmental development. The ARDN account is projected to decline as a percentage of development assistance functional accounts. In 1986, the ARDN account was allocated $759.9 million, representing 47 percent of total functional account allocations. Projections for 1990 indicated that ARDN will receive $477.7 million, or 39 percent of total functional account allocations [83].[2]

Concern also has been raised over declines in the actual buying power of the ARDN account. AID/S&T's Office of Agriculture estimated that, after adjusting for inflation, the 1988 ARDN budget would purchase only about 44 percent of what the 1977 budget could buy [101].

Decline in the ARDN account reflects an overall decline in Development Assistance (DA) as a proportion of total foreign economic assistance, primarily due to an increase of obligations under

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[2] The fiscal year 1992 AID appropriation request to the Congress recommended that the eight functional accounts, including the ARDN account, be aggregated into a single nonfunctional "Development Programs" account that would provide flexibility in funding allocation. Certain priority areas, including "the environment," are to be assured funding at levels consistent with fiscal year 1991 allocations [56].

Economic Support Funds (ESF).[3] An AID response to this trend was to use part of ESF to fund projects, including those similar to ARDN activities. While not originally envisioned, this use of "projectized ESF" has helped offset downward trends in ARDN funding.

Obligations for ARDN-type activities (funded through both DA and ESF accounts) have been $1 billion a year since 1982, although there have been significant fluctuations (some in the hundreds of millions of dollars) between years. Obligations for ARDN-type activities declined by 20 percent between 1984 and 1989 [76]. (Nonprojectized ESF and P.L. 480-generated local currencies may also be used for ARDN-type activities. Their use in this way is not well documented and is not included in data on funding of ARDN-type work.)

A recent study examined ARDN-type obligations for the period 1984 to 1989 by breaking them down into 12 purpose categories (table 2-2). Overall AID has focused its efforts in five areas: construction, credit, sector support, technology transfer, and technology development. Only the central bureaus, especially the Bureau for Science & Technology, focus substantial attention on developing LDC capacity to develop, manage, and conserve soil, water, and other resources (Resource Development) or on strengthening LDC capacity for conducting research on improved technologies for production and consumption (Technology Development). Further, considerable uncertainty exists regarding data on funding of natural resources and environment activities (box 2-B).

Diminishing ARDN and ARDN-type funding, and redirection of activities away from resource and technology development, reduce the opportunities for university involvement in development activities and lead to competition over the types of activities to be funded. Further declines in ARDN will lead to increased tradeoffs between natural resources work and the more traditional agricultural activities.

Program Trends

In addition to the type of development work that AID supports, certain changes in the way in which it does its work affect future university involvement. Program trends include: agency decentralization; emphasis on short-term results; reduced AID staffing, particularly of technical personnel; increased project size; increased use of nonuniversity contractors; and transition to a performance-based budgetary system. Many of these trends are reinforced in the proposed AID guidelines "Towards Strategic Management," December 1990, which states:

> Some planning assumptions being explored are that AID will be a smaller bureaucracy, with most of its staff overseas, running the same-sized or larger program in dollar terms. AID may move toward "wholesaling" a set of tested development approaches in certain areas, through private, non-profit or university organizations. . . . There may be two main groups [of AID staff]: highly skilled managers with a clear career path and technical specialists employed as their skills are required. Larger blocks of work may be run under contracts and grants. There will be greater autonomy for field operations within a system of evaluation and operational/financial auditing to assure accountability. Promotion, incentives and awards will flow to those individuals and teams who can show program impact, account for resources and find a productive balance between innovation and prudence.

Agency Decentralization

Decentralization of decisionmaking and a shift of management responsibilities to the AID Missions occurred throughout the 1980s. Mission directors gained authority in 1985 to approve and implement projects costing up to $2.5 million based on initial Project Identification Documents if no major issues are raised. The goal of decentralization was to increase administrative efficiency and allow personnel with on-the-ground expertise to make decisions.

Decentralization has hindered use of centralized programs, such as Title XII, and thus may make

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[3] AID's foreign assistance funds are divided into two accounts: Development Assistance (DA) funds and Economic Support Funds (ESF). Although some ESF funding has been redirected to development assistance projects, these accounts generally are allocated based on political objectives rather than on development assistance goals, and are directed to only a few particular countries. Further, these funds cannot be accessed by central bureaus such as the Bureau for Science and Technology. The Development Assistance accounts are the primary source of funding for agriculture, natural resources, and environment projects, especially through the Agriculture, Rural Development, and Nutrition (ARDN) account. Funding for "ARDN-type" activities may also come from functional accounts, such as the Private Sector, Energy and Environment, and through Economic Support Funds. The new Development Fund for Africa, created in 1988, combined all funds for Sub-Saharan Africa (including those previously funded from the ARDN account) into a single fund for development assistance to the region, complicating estimates of funds and program activities in agriculture, natural resources, and environment. Aggregation of funds into a single nonfunctional account also would complicate budget analysis, although AID is developing a system to improve accountability for use of appropriated funds [56].

Table 2-2—Percent Distribution of ARDN-Type Obligations by Purpose Category for AID as a Whole and by Regional and Central Bureaus, 1984-89

Purpose-category	AID	Africa	Asia & Near East	Latin America & Caribbean	Central Bureaus[a]
Construction	17.5	10	24	10	0
Credit	17	2	20	33	14
Educational systems development	2.5	4	3	0	0
Human resources development	3.5	5	3	5	1
Input supply	2	5	3	0	0
Land tenure	1.5	0	0	9	1
Marketing	2.5	2	0	11	0
Planning and policy analysis	6	7	6	5	5
Resource development	4.5	3	4	4	13
Sector support	16	35	12	4	0
Technology development	11.5	14	6	7	64
Technology transfer	15.5	15	18	10	2

Totals may not add to 100 percent due to rounding.

[a] The column includes data for the following AID bureaus: Science & Technology; Food for Peace and Voluntary Assistance; and Private Enterprise. The study did not include data from the Bureau for Program and Policy Coordination, which in 1985 became the source of AID's core contribution to the International Agricultural Research Centers of the CGIAR (≥ $40 million annually). The table thus undercounts the Technology Development category (which actually represents the majority of this funding) and to a lesser extent the Technology Transfer, Resource Development, and Human Resource Development categories.

NOTE: Between 1984 and 1989, 54 percent of ARDN-type obligations were in Asia and the Near East, 25 percent in Sub-Saharan Africa, 12 percent in Latin America and the Caribbean, and 9 percent in the Central Bureaus. These percentages were calculated after including AID Central Bureau contribution to the core budget of the International Agricultural Research Centers for 1985-89.

SOURCE: U.S. Agency for International Development, AID Washington Technical Personnel, and Chemonics, International Consulting Division, "Agriculture, Rural Development and Nutrition Portfolio Review: Analysis and Recommendations," prepared for AID's Working Group of the Joint Sector Councils of Agriculture, Rural Development, Natural Resources, and Nutrition, Dec. 30, 1988. Data for core contributions to the International Agricultural Research Centers provided by AID, Bureau for Science and Technology, Office of Agriculture, CGIAR Staff, June 1989.

Purpose-Category Definitions

1. **Construction:** to construct* or strengthen* the capacity to construct basic facilities/infrastructure—transport, communications, water supply/waste disposal systems. Does not include construction undertaken as an ancillary activity of project classified under any other category.
2. **Credit:** to improve* or strengthen* the capacity to improve the delivery of credit for production and consumption.
3. **Educational systems development:** to develop* or strengthen* the capacity to develop education institution structure/curricula/operations/facilities.
4. **Human resources development:** to improve* or strengthen* the capacity to improve training and human resource development.
5. **Input supply:** to improve* or strengthen* the capacity to improve the delivery of services and physical inputs for production and consumption.
6. **Land tenure:** to improve* or strengthen* the capacity to improve access to and/or ownership of land, water, and other resources.
7. **Marketing:** to improve* or strengthen* the capacity to improve assembly, handling, processing, storage, transport, and/or distribution of commodities and products.
8. **Planning and policy analysis:** to conduct* or improve* the capacity for conducting economic planning and analysis of policy issues. Includes data collection and processing.
9. **Resource development:** to develop* or strengthen* the capacity to develop, manage, and conserve soil, water, and other resources.
10. **Sector support:** to provide balance of payments and program support primarily for sector economic development. Includes Commodity Import Programs, Sector Grants, and Program and Development Support funds.
11. **Technology development:** to improve* or strengthen* the capacity for conducting research on improved technologies for production and consumption.
12. **Technology transfer:** to extend* or improve* the capacity for extension/diffusion/transfer of improved technologies for production and consumption.

* or expand, establish, study, organize, etc. as appropriate.

university involvement in development assistance more difficult. Universities and BIFAD commonly depended on AID/Washington for information on upcoming Title XII projects. With authority transferred to the Missions, universities and BIFAD must increase their links to the Missions to keep track of and be prepared to respond to potential projects [117]. In addition, increased Mission authority combined with current reward systems may lead to decreased attention to long-term projects, such as

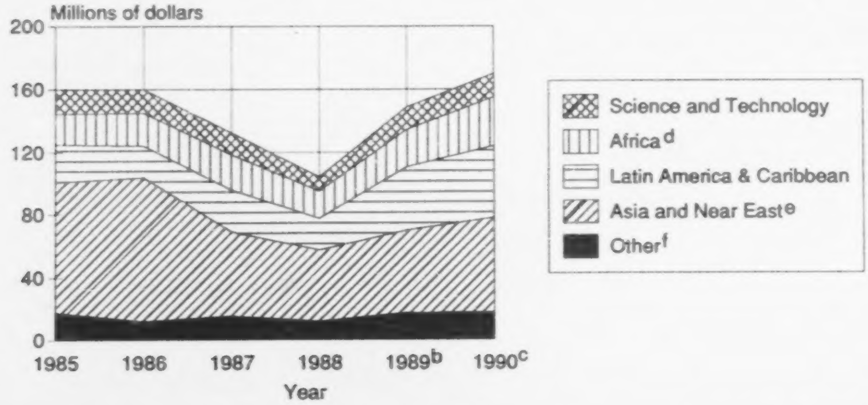
Box 2-B—Funding for Environmental and Natural Resources Activities

Uncertainty and controversy surround the data on AID funding of environmental and natural resources (ENR) activities. Concerns exist that the data significantly undercount AID's ENR activities. Because ENR has only recently become a major issue, past funding was not broken out by ENR obligations, and trends cannot be reliably determined with existing data. Sources of AID obligation data show that ENR obligations were increasing from the 1970s to the mid-1980s; declined in the later 1980s; and are expected to rise through the early 1990s. These sources, however, have been criticized for their weaknesses in counting ENR obligations.

AID's Bureau for Program and Policy Coordination (AID/PPC) developed obligation data for 1985 to 1988 by examining individual projects, breaking out the ENR portion, and cross-checking results with individual bureaus. AID/PPC has since established an automated system for tracking ENR obligations. Project officers at each mission identify ENR obligations for each project, and this work is reviewed by the regional bureaus and compiled by AID/PPC. This system currently contains data compiled for 1989 to 1990, which has not yet been fully reviewed. Data for both periods are combined below. However, due to the change in compilation methods, data may not be fully compatible.

The figure shows a higher level of AID obligations for environmental and natural resources activities than other sources show. The data indicate that AID ENR obligations reached a high point in the mid-1980s, then declined in the latter 1980s. Despite the new Environment Initiative and other activities, such as the Forest Management Project II that will provide $65 million to forestry and natural resource activities in 42 nations [47], it is unclear to what extent ENR obligations will rise in the 1990s. If funds for such activities do not rise appreciably, then university involvement in ENR work may not grow as projected from mid-1980's obligation trends.

Obligations for Environment and Natural Resources Actvities: AID Total and by Bureau



[a] Data for this figure come from two different collection systems, therefore 1985-88 data are not fully compatible with data for 1989-90. Data for 1985-88 were developed by AID's individual bureaus and the Bureau for Program and Policy Coordination's (PPC) reviews of individual projects. Data for 1989-90 came from a newly implemented, automated system under which the project officers in the Missions provide the data from each project, which is then reviewed by the individual bureaus and compiled by PPC. The data for 1989-90 have not been fully reviewed.

[b] Estimated.

[c] Projected.

[d] Data displayed for the Bureau for Africa are about 50 percent lower than those calculated by the Bureau for Africa. This discrepancy is due to different definitions of environment and natural resources activities used by PPC and the Bureau for Africa.

[e] Data for the Bureau for Asia and the Near East do not include funding for four wastewater projects in Cairo, Egypt whose obligations run from $85 to $250 million a year over this period.

[f] Includes the Office of the Science Adviser, the Bureau for Food and Voluntary Assistance, and the Bureau for Program and Policy Coordination (Primarily the core funding it provides the CGIAR).

SOURCE: U.S. Agencv for International Development, Bureau for Program and Policy Coordination, unpublished data on environment and natural resources management obligations for 1985-87, summer 1987; initial 1988-90 environment and natural resource management obligations submissions from AID Missions to AID headquarters for review.

research and institution building relative to work that brings observable results in the short-term (see app. E).

Reduced AID Staffing

Long-term projects are hampered by short-term changes in AID policy and personnel. Declines in relevant staff, such as agricultural development officers, environmental scientists, and training officers, can restrict the number or extent of projects or hinder reform implementation [46]. In addition to lack of AID staff, institution-building work, often seen as requiring 10 to 25 years to succeed, can be hampered by staff turn-over [30]. Mission directors and agricultural and rural development office management average 3 years or less per tour of duty [26].

Changes in personnel often result in changes in AID policy and programs that adversely affect the continuity required for long-term projects. Adding to this problem is AID's system that rewards planning and design more than implementation, thereby reducing the incentive to maintain continuity [111,112]. Inability to carry out long-term work may strongly affect the Agency's environmental and natural resources activities since many problems faced in resource-poor regions are not well understood and may require long-term work to develop solutions.

Reduction in AID technical staff and increasing focus on management may also create new opportunities for university involvement. If agricultural development, natural resource management, and improvement of environmental quality continue as primary foci of AID work, AID will need to draw increasingly on outside technical expertise. Universities may be one source. Joint Career Corps, Indefinite Quantity Contracts, and other such mechanisms could be used more to draw on university technical capabilities (see box 1-B in ch. 1).

Increased Project Size

AID has reduced its management responsibilities by designing larger and fewer projects than in the past. Accompanying this was a shift of project management responsibilities to AID's contractors. Larger projects push universities to combine into consortia with other schools, private firms, and others and, as a consequence, reduce their management autonomy.

Use of Nonuniversity Contractors

Growing numbers of organizations have become involved in international development and have worked with AID over the years. Currently, U.S. universities face competition from an increased number of nonuniversity development organizations. Some of these have direct AID or congressional support. For example, AID's emphasis on private sector development has fostered increased use of private U.S. firms, and Congress has placed funding earmarks on development assistance for private, voluntary, and minority firms. Congress earmarked 13.5 percent of certain development and disaster assistance for PVOs in 1981 and, in 1984, 10 percent for certain minority contractors. GAO found that 17 percent of ARDN funds went to PVOs in 1987 [106].

Increased open competition for projects has also been stressed, and some mechanisms used to tap universities have been withdrawn, in part, because of their noncompetitive nature. In addition, other development actors now compete directly for work in which universities are considered to have strengths. Private firms may be used to place students in university programs. The International Agricultural Research Centers carry out agricultural institution building and research, and provide training. Private firms also engage in institution building. Increased university involvement may be constrained by that of these other organizations, especially if development assistance funding stabilizes or decreases further.

Shift to a Performance-Based Budgetary Systems

In response to concerns over increased reporting requirements and decreased program flexibility, Congress and AID created the Development Fund for Africa (DFA) in 1987 to provide development assistance to Sub-Saharan Africa without earmarking funding. Assistance for agricultural development under the DFA is projected to fall from 43.7 percent of the DFA in 1988, when it was implemented, to 31.8 percent in 1990 (a drop of about $60 million) [85]. Based on projections, reduction of earmarks points to reduced emphasis at AID on agricultural development and, thus, a correspondingly reduced role for universities.

Chapter 3

Perceived Conflicts in the AID/University Relationship

Since their earliest formal involvement in foreign assistance programs, universities have had a troubled relationship with the Agency for International Development (AID), prompting a number of evaluations of joint activities. A string of reviews conducted from the 1950s to the present reveal numerous and persistent problems in the AID/university partnership. A number of recent papers, seminars, workshops, meetings, and conferences by members of the university community, AID, the Board for International Food and Agricultural Development (BIFAD), the National Association of State Universities and Land Grant Colleges (NASULGC), various foundations, and other organizations have probed these problems in greater depth.

HISTORICAL CONFLICTS

One of the earliest conflicts between AID and university officials surfaced in 1956. Dismayed by lack of support for institutional contracts abroad by top AID officials, and the perceived hostility of AID officials towards universities, the American Association of Land Grant Colleges and Universities (forerunner to NASULGC) threatened to withdraw its member institutions from participation in AID programs. A meeting by the AID Administrator with a group of university presidents led to some changes, most focused on the operating level. For example, a "standard" contract format geared towards involving universities in AID projects was created. A task force on AID/University Relations was formed in 1963 to find ways to simplify contract procedures and to improve cooperative action by AID and the universities. AID and the universities took few actions on Task Force recommendations [27].

A 1968 NASULGC Task force recommended establishment of a new development assistance agency outside the aegis of the State Department to reduce conflict between development assistance and foreign policy objectives [7]. The proposed agency would support scientific and academic technical assistance, institution building, and international institution-to-institution relationships. The Task Force believed that an agency isolated from foreign policy crises would eliminate some of the conflicts troubling AID/university relations.

AID and NASULGC formed a Joint Committee that subsequently issued the following eight criteria for optimizing the effectiveness of the AID/university relationship:

1. proper matching of universities with development assistance activities,
2. joint planning,
3. improved program evaluation and feedback,
4. flexible implementation authority,
5. effective management by the universities,
6. employment of qualified personnel,
7. strengthening of U.S. universities' ability to support development assistance activities, and
8. enhancement of host institutions' capacities to induce and sustain changes in the host country [7].

Other recommendations included developing long-term commitments from universities and broadening professional opportunities for university faculty under AID contracts. This study served as a foundation for the Title XII legislation in 1975.

Although U.S. universities had high expectations of Title XII, these were not met. The U.S. General Accounting Office's (GAO) 1981 evaluation concluded that AID and the universities had not yet forged an effective partnership. Blurred lines of authority within AID made implementation of projects difficult and caused numerous misunderstandings. University policies regarding promotion, tenure, and salaries were incompatible with fostering faculty participation in development assistance. Thus, GAO contended that U.S. universities commonly lack the capacity to make significant contributions to AID's development program [107]. The 1986 McPherson survey also revealed dissatisfaction with university performance and expressed concerns that BIFAD, the entity responsible for intermediating between AID and universities, acted more as an advocate for university involvement than as a mediator in the partnership [40].

Various AID officials and AID Mission directors expressed disillusionment with the Title XII program, and specifically with the limited competition for Title XII projects. A top AID official upon reading the responses of 39 Missions and 14 universities to the 1986 McPherson survey on Title XII commented:

> My reading of the responses, frankly, leads to a conclusion that many USAID Mission directors and USAID staff are becoming somewhat disenchanted with Title XII universities due to weaknesses in past performance. This growing disenchantment is reflected by a growing reluctance to set aside projects for Title XII universities and a desire for more private sector-Title XII competition. There also appears to be some erosion of the previously held assumption that Title XIIs have a predominant capacity in agricultural research, technology transfer and institution-building activities. The universities, however, still feel they have predominant capability in these areas. . . .
>
> The perceived weakness (of performance by universities) needs to be dealt with, and most Missions feel that they *can* be dealt with so that in the future they will feel more comfortable in choosing to work with a Title XII university. Most Missions recognize the marvelous resource base which exists in the U.S. university community and want to use Title XII. Performance has not, however, lived up to potential [14].

One university administrator commented:

> A central problem which limits the effectiveness of Title XII progress is the inability of AID professionals in the field to accept and take advantage of the university's role. Suspicion has evolved in the system and too many stories of university inadequacy go unverified and uncontested [119].

GAO reevaluated the Title XII program in 1989 and found a significant decline in university involvement in development assistance activities. The report attributed the decline to budget decreases in AID's agricultural development account, decreasing emphasis on institution-building, increased AID emphasis on private sector initiatives, and a reluctance on the part of certain AID officials to designate projects as Title XII.

RECURRENT CONFLICTS

Among the AID/university conflicts are some that recur largely due to differences in development assistance philosophy between the two types of organizations, and differences in organizational structure and goals (see also app. E). These include: conflicts between humanitarian development assistance objectives and political foreign policy objectives, shifting AID policies and priorities, difficulties in communication, mismatched personnel goals and systems, and conflicting personnel timeframes. In addition, the growing AID preference for open contract competition is giving rise to new conflicts between AID and universities with which it has historically worked. Few of these conflicts are likely to be resolved without substantial revision of organizational policies and structures.

Subordination of Development Assistance Objectives to Foreign Policy Objectives

Although universities successfully maintained an apolitical stance in their initial forays into development assistance, formal collaboration with the U.S. Government inevitably politicized the nature of their work. U.S. development assistance is inherently political: although humanitarian motives spurred the creation of the Point Four Program in 1949, strong political antecedents as well as powerful economic objectives were also involved.

Blurring of boundaries between U.S. development assistance programs and U.S. foreign policy initiatives and objectives is a persistent problem from the university perspective.

> Probably no issue more profoundly affects the AID/university collaboration than that posed by the juxtaposition of political sponsorship, on the one hand, and the tradition of academic institutional independence, on the other. American universities have historically resisted domination by the publics they serve. The marked increase in the interdependence between government and the universities during the last decade in particular has not deadened the sensitivity of the academic community to the problem of political control [35].

In 1989, the House Foreign Affairs Committee sponsored the International Cooperation Act of 1989 that proposed repealing Title XII and establishing a university-oriented development assistance organization separate from the State Department [3]. The presumption was that this autonomy would shelter the development assistance program from foreign policy, would provide a stronger role for the universities in the areas of research, extension, and education, and could involve all related disciplinary programs in the universities. Programmatic and budget management authority would be given to the Center for programs in all centrally funded areas; the Center also would have had authority to oversee programs developed and funded by AID's country Missions.

The International Cooperation Act of 1989, however, was not passed. Under the current restructuring, AID and the newly established Center for University Cooperation in Development remain under the aegis of the Department of State.

Shifting AID Policy

From universities' perspectives, numerous shifts in AID policy have also hindered university performance in overseas development. AID has changed its priorities over the years, sometimes deeming university activities to be outside the realm of their current area of interest. Universities have had difficulty identifying AID priorities and understanding apparent contradictions in AID policy. Universities dislike shifting their own activities in the direction of changing AID policies and often find it difficult to do so.

Substantial decreases in government funding for development activities has forced AID to identify and focus on specific priority areas. Proliferation of unranked objectives and congressional earmarks for specific development assistance programs, geographical regions, and types of development assistance organizations reduces long-term consistency and has forced AID to use resources on mandates that may not be relevant in specific cases or whose goals may not be clear [110]. The lack of consistency and clarity of objectives has reduced Congress' ability to maintain and modify the direction of U.S. assistance, and also limits the monies allocated to U.S. universities.

AID has placed great emphasis on two priorities: policy dialogue and reform and private sector development. Universities have not participated actively in these two areas. The few universities that have participated in AID-supported policy work have tended to be nonland-grant institutions. Further, the focus on private sector development has redirected assistance from host country public institutions, such as national agricultural research systems, with which universities have worked in the past, to private organizations, with which universities have not traditionally worked. In addition, AID has interpreted private sector development to mean an increased focus on the provision of assistance through private organizations, such as private firms and private voluntary organizations.

The other two "pillars"—institutional development (including human resource development), and technology research, development, and transfer—include activities more suited to university capabilities, but have not received as much attention. Personnel training, institution building, and technology development nonetheless are cited commonly as major AID accomplishments. For example, the World Bank recently identified the United States as the only donor playing an effective role in building African agricultural scientific manpower [39]. And yet, Agency commitment to these two pillars does not appear as strong as AID documents suggest. For example, support for human resource development and educational system development constitute a small part of AID's ARDN-type work (see table 2-2 in ch. 2). Although concern has been focused on Sub-Saharan Africa where the lack of trained personnel and functional institutions is seen as especially detrimental to development [21], AID's Plan for Supporting Agricultural Research and Faculties of Agriculture in Africa remains underfunded, especially for the faculties of agriculture [89].

Obligations for technology development declined about $40 million between 1986 and 1988, and technology development as a percentage of ARDN-type obligations fell about 2 percent[1] [76]. Opportunities may exist to increase funding of this work. For example, the Latin America and Caribbean Bureau has concluded that its nontraditional, export-led strategy will require research and technology development or adaptation; the Asia and Near East Bureau is stressing increased cereal grain production in low-income countries; and the Africa Bureau has had a plan for agricultural research since 1985 (see app. C). Obligations for technology transfer have been increasing in all regions, although in some cases, such as nontraditional crops in Latin America and the Caribbean, AID may not be turning to U.S. universities for this work.

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[1] These figures are calculated without the inclusion of the U.S. core contribution to the International Agricultural Research Centers, the majority of which could be classified under technology development. Core obligations for the centers dropped over $6 million during this period (about 13.5 percent of the contribution of 1986, the peak year).

Communication Constraints

Universities have centralized collegiate bureaucracies that commonly conflict with AID's decentralized, hierarchical bureaucracy. AID's decentralized structure places a great deal of control in the hands of Mission directors—too much, according to some university participants in joint projects. Misunderstandings and poor communication between university personnel and AID Mission directors are common, and little opportunity exists for face-to-face discussion, nor are there other mechanisms to broach this long-acknowledged gap between university personnel and Mission directors. One university participant commented:

> The pattern of decentralization at USAID has been likened to an octopus with each tentacle having its own power. The decisions and actions by country Missions and Mission directors vary so that it is becoming extremely difficult and nonrewarding for universities to be involved in international development contracts [120].

Conversely, university bureaucracies may hinder Mission directors in AID/university transactions. For example, some universities may resist allocating control of AID/university contracts to their representatives in LDCs; instead, universities prefer, or may be obligated by law, to manage contracts from their U.S. campuses. Remoteness of decisionmakers from development assistance activities can slow organizational and decisionmaking processes.

Conflicting Personnel Systems

Another barrier to successful AID/university collaborations is conflicts inherent in AID's and universities' personnel systems. AID project staff turnover and misplacement of technical experts may hinder achievement of project goals [111]. Conversely, university staff turnover, tenure obligations, and dearth of financial support or professional rewards deters some faculty from participation in development assistance programs.

Rapid turnover of AID staff, particularly of Mission directors, has led to discontinuity in AID programs. New AID personnel entering an ongoing project also may have different project goals and expectations than their predecessors. For one university project, there were over a 36-month period "two Agricultural Development Officers and seven project managers, each wishing to put his or her imprint on the project outcome" [118]. Moreover, project managers may be junior AID employees with little technical expertise or training to support participation in the projects that they manage [2].

Frequent turnover also may hinder university staff effectiveness in development assistance programs. Some in AID contend that about the time that university personnel are becoming effective, they are rotated back home and another faculty member comes in to begin a "learning process." On the other hand, universities contend that while personnel may inevitably change, there is continuity of leadership, understanding and commitment to the project through stable university structure [119].

Some AID employees assert that universities do not contain sufficient numbers of adequately trained and interested staff to justify favoring universities in AID contracts. The perceived lack of U.S. university commitment to international development is evidenced, it is argued, by:

- inadequate integration of international programs in university departments,
- dearth of support for faculty and student research in foreign countries and with international organizations,
- inadequate university investment in development assistance initiatives,
- inability of university staff to commit to long-term projects, and
- deficient university capabilities in areas integral to international development work [cf: 25].

Obligations associated with the tenure system and the general lack of rewards and incentives for university personnel working in the international development field discourage university staff from becoming involved in development assistance activities. University faculty may focus on subjects that lead to generation of publications and other forms of peer or public recognition to achieve tenure. Much of the research needed in LDCs is of an applied nature and may not appeal to university researchers, or be more readily conducted by nonuniversity organizations. Thus, university personnel participating in AID-funded projects overseas may be older faculty members with secured tenure that may not be up-to-date with current scientific or technological advances, or young faculty members with little experience. Further, difficulties in finding replacements for faculty sent overseas potentially lead university administrators to discourage faculty wishing to participate in development assistance work.

Adverse reactions by the primary constituents of land-grant universities—farmers and other agriculturalists—also may induce some university faculty to avoid work in international development assistance. Farmers are generally characterized as perceiving international agricultural development activities as a threat: by stimulating production in LDCs, they promote competition for markets [60] (figure 3-1).

An argument commonly used to convince U.S. farmers to support the land-grant universities' participation in international development work is that returns will directly benefit American society and U.S. farmers (box 3-A). This argument fails to completely convince agricultural audiences, largely because the rewards of overseas work tend to be unpredictable and do not solely benefit the farmers of the individual State supporting the development assistance activity. Even State legislators prepared to accept the reverse technology transfer argument may find it "more convenient to let another State pay the bills" [38]. A general belief exists among many U.S. agriculturalists that State funding should be devoted to domestic or State-related programs, whereas Federal funding may be allocated for international purposes [58].

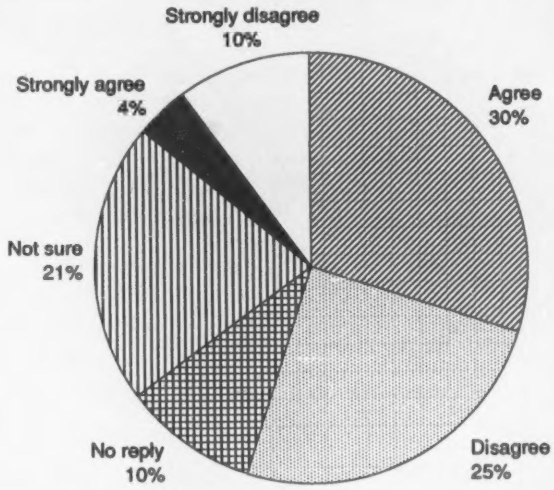
Conflicting Development Assistance Timeframes

Historically AID has aimed at short-term solutions to development problems and universities have preferred long-term involvement, with ensuing conflict. Congressional pressure accounts for much of AID's emphasis on short-term results, as does AID's reward system [111].

Whereas university personnel arrange their schedules in terms of the academic year, AID personnel have a much more flexible but less predictable calendar. AID projects are subject to delays, and university personnel may not have the freedom to coordinate their schedules with a revised project schedule.

Conversely, universities bring stability to international activities. Unlike many private firms, which are subject to fluctuations of the economy, and PVOs (particularly smaller ones), which are vulnerable to abrupt changes in funding and constituent support, universities largely are organizations with long histories and reasonably assured futures. Once established, relationships and collaboration between U.S. faculty and LDC colleagues can endure—despite periods of strained political relations between countries. Mechanisms such as the tenure process, often seen as interfering with university involvement in development assistance activities, can also be viewed as a force contributing to long-term continuity of faculty. As a result, the objectives and overall philosophy of a university tend to remain consistent over long periods of time, promoting concomitant consistency in the quality and objectives of the work university personnel perform.

Figure 3-1—U.S. Farmer Views on Whether the United States Should Assist Developing Countries Increase Their Agricultural Productivity and Trade Potential



[a] Based on 21-State composite.

SOURCE: H.D. Guither et al., "U.S. Farmers' Preferences for Agricultural and Food Policy in the 1990s," North Central Regional Extension Publication 361, North Central Regional Research Publication 321, Illinois Agricultural Experiment Station Bulletin 787, University of Illinois at Urbana-Champaign, November 1989.

AID Preference for Open Contract Competition

AID personnel tend to prefer open competition for projects, which may promote selection of the most competent available contractor for a given project. Private firms are playing a growing role in the AID development assistance program. Some believe that

Box 3-A—Building a Domestic Agricultural Constituency for International Agricultural Development

University involvement in foreign agricultural assistance has been plagued by strained relations between land-grant universities and U.S. agricultural interest groups. Farmers may oppose agricultural assistance as a result of more general critical attitudes towards foreign affairs and, in particular, foreign aid. Surveys comparing the attitudes of farmers to those of the general public on foreign aid have found that U.S. farmers: 1) felt more strongly that economic aid to other nations hurts the U.S. economy, 2) felt the U.S. should restrict imports from Third World countries until the U.S. trade deficit is lowered (83 percent v. 60 percent), and 3) were less supportive of opening U.S. markets to assist developing countries (17 percent v. 32 percent).

Moreover, some U.S. farmers together with producer organizations and their representatives in the U.S. Government, perceive the participation of the land-grants and other public agricultural research organizations in development assistance programs as contrary to the interests of U.S. agriculture. Opponents argue that production-oriented agricultural aid operates as a subsidy that unfairly strengthens their international competitors, assisting developing countries to produce and export larger volumes of commodities at a lower cost than they could without U.S. aid. Critical U.S. farmers argue that publicly owned technical resources, which farmers themselves help support through taxes, should not be used to their own economic detriment.

In response to these criticisms, U.S. universities and the broader development assistance community have developed several lines of reasoning to convince farmers of the merits of land-grant involvement in development assistance abroad, and its benefits to U.S. agriculture. The primary argument for continued aid is based on the expansion of markets for U.S. agricultural products resulting from increasing Third World incomes. In the long run, growth in the agricultural sector of lesser developed countries (LDCs) stimulates aggregate agricultural imports into those countries. This somewhat paradoxical effect occurs because Third World farmers' disposable income grows faster than indigenous agricultural production. In particular, as incomes rise, LDC farmers buy more meat and dairy products, but do not generally produce enough feed to satisfy these changing tastes. Producers of feedgrains and soybean meal, among which the United States is the largest, would tend to benefit from the increased foreign demand.

Despite historical evidence supporting this argument, it is no longer univerally applicable. Patterns of economic development vary from developing country to developing country: U.S. commodity producers are not all affected the same way by Third World economic growth. High national debts also have tended to negate much of the value to U.S. farmers of foreign agricultural development: debtor countries are forced to spend their added income on debt repayment rather than additional imports. Nonetheless, this argument, when propounded by individuals whom farmers trust, has been moderately effective in building constituencies for land-grant university foreign assistance programs in some States.

Other arguments for aid include:

- Increasing LDC consumption of even competitive commodities will potentially increase demand for U.S. production, especially if U.S. products have higher quality.
- U.S. scientists participating in foreign agricultural assistance, and particularly international agricultural research, can incorporate research results into ongoing U.S. research programs. Research results can then be transferred to U.S. farmers for use in domestic production.
- Research may focus on improving pest control, nutrient management, or storage practices, potentially reducing U.S. production costs.
- Access to LDC germplasm can improve cultivars available to U.S. farmers through breeding programs for characteristics such as drought tolerance or virus resistance.
- International research may provide faculty and students with a global perspective, beneficial in an increasingly interdependent world, and can contribute to the land-grant university's reputation and subsequent ability to attract high-quality personnel.

Land-grant universities have undertaken a variety of programs to counter opposition and strengthen support for their development assistance programs. A crucial element in all of these constituency-building programs seems to be the trust that farmers have in the expertise of land-grant faculty and staff, and their social identification with these land-grant personnel. Because extension personnel work most closely with U.S. farmers, they may be a particularly valuable asset in university attempts to build constituencies for agricultural development assistance programs.

Box 3-A—Continued

While long-standing personal relationships between land-grant experts and farmers may be the most effective means to communicate the benefits of land-grant development assistance programs, land-grant universities have also employed more formal means to gain farmer support for international programs. Most land-grant Title XII offices publish newsletters on the universities' agricultural assistance programs, highlighting the benefits of these programs for farmers of a State or region. The University of Illinois' *International Agriculture Update* is perhaps the most ambitious of these newsletters. In addition, faculty working on AID grants often hold field days, during which farmers can examine research projects intended to assist developing countries, ask questions, and air concerns about the projects.

Most land-grant universities receive some funds from State- and National-level producers organizations for commodity-specific research. Use of these funds commonly is determined by committees composed of land-grant personnel and members of the commodity association's research committees. Faculty involved with international programs periodically use these committee meetings to inform farmers about the programs and to answer questions.

The principal organizations representing land-grant faculty active in agricultural development assistance programs—the National Association of State Universities and Land Grant Colleges (NASULGC) and the Association of International Agriculture and Rural Development (previously the Association of U.S. University Directors of International Agricultural Programs)—have produced educational materials intended to educate farmers and other traditional land-grant constituencies about the value of their work for U.S. agriculture. For example, the latter institution recently published a brochure that clearly explains how "technical assistance to developing countries expands the world markets in which U.S. agriculture must compete" [5]. Since at least the mid-1980s, when farmer opposition to publicly funded agricultural research and technical assistance for development reached its peak, land-grant experts also have used the annual meetings of these two organizations to discuss ways to build support within the farm community for development assistance programs.

Some universities have indirectly used AID's Biden-Pell program, begun in 1982 for educating the U.S. public about development assistance. Biden-Pell monies are intended for the use of private voluntary organizations (PVOs), but some of these PVOs have worked with universities to educate farmers about developing countries and development assistance programs. Little formal evaluation of Biden-Pell educational projects has been undertaken by AID, and it is difficult to ascertain the impact of the program in the farm community. However, AID and internationally oriented agricultural experts in land-grant schools generally believe that the program has helped alleviate opposition to foreign agricultural assistance.

The Biden-Pell program that was perhaps most closely associated with the universities was conducted by the Consortium for International Cooperation in Higher Education (CICHE) during the mid-1980s. The creation of CICHE was inspired by NASULGC personnel and was "designed to mobilize the resources of the Cooperative Extension Service (housed on land-grant campuses) to enhance citizen understanding of. . . the stake of the U.S. in international development." CICHE, in cooperation with Extension personnel in four states (Georgia, Michigan, Rhode Island, and Utah), produced a variety of educational materials, primarily focusing on the benefits to the United States of agricultural assistance. These materials were then distributed to internationally oriented extension leaders throughout the country.

Another way the Cooperative Extension Service has built constituencies for land-grant development assistance programs is through a farmer-to-farmer assistance program. Funds for the program, obtained through the "P.L. 480" food aid program, also were intended for use by PVOs. However, the international office of USDA's Extension Service (the Federal arm of the Cooperative Extension Service) is attempting to obtain authority to disburse some of the farmer-to-farmer funds to State extension services. Part of the office's intent is to employ U.S. farmers returning from short-term consultancies in developing countries, together with internationally oriented extension personnel, to convey to other U.S. farmers the value of agricultural development assistance for LDC farmers and U.S. agriculture.

SOURCE: Based on Robert C. Stowe, "U.S. Universities and Constituency Building Development Assistance," contractor report prepared for the Office of Technology Assessment, August 1989.

AID's current emphasis on the private sector undermines the Title XII program because private consulting firms operate under competitive, but less restrictive, regulations and may use university personnel to staff projects [119]. Others fear that private consulting firms operated by ex-AID staff will receive an unfair advantage in contract competition deriving from previous personal connections [2].

AID preference for private firm contracts may reflect dissatisfaction with university performance in private sector development activities, or may indicate recognition that private firms are more suited for participation in private sector development activities than universities. AID personnel have encountered various difficulties managing university contracts. Among the complaints lodged by Missions: universities tend to be less cost-conscious and university personnel tend to be less familiar and have less experience working with AID than private sector firms. Universities are also perceived as being less responsive to AID project needs [4,52].

Continuity of many U.S. university/LDC institution relationships probably will not be sustained (i.e., continue when AID financing is no longer forthcoming), however, without AID resources [51]. Thus, AID is supporting an Institutional Linkage program based on encouragement of noncontractual linkages between U.S. universities and LDC institutions, and of collaboration between universities and the private sector.

Chapter 4

Opportunities for U.S. University Participation in Development Assistance

Changes in development assistance policy have affected every member of the development community. Significant constraints on funds allocated to U.S. development assistance activities, and the resulting cutbacks in U.S. Agency for International Development (AID) management staff, have led to a decrease in the number of AID-supported development projects. As the number of projects has decreased, individual projects have grown larger, demanding different types of management skills and participation. Simultaneously, increasing numbers of development assistance enterprises have emerged. Thus, while opportunities for involvement have diminished, the number of parties eager to participate have grown. These shifts have sparked increased competition—for projects and for funds—for which U.S. universities, because of the Title XII program, were not prepared.

Opportunities may exist for increased university involvement in international activities promulgated by Federal agencies other than AID. AID's changes also may open opportunities for collaboration among U.S. universities and between universities and private voluntary organizations, private sector firms, agribusiness, and International Agricultural Research Centers. Land-grant universities have had some success in collaborating with other U.S. organizations; the potential exists for extending this experience to their international work.

COLLABORATION AMONG UNIVERSITIES AND OTHER DEVELOPMENT ORGANIZATIONS

Effective marshaling of resources has become a crucial issue given depletion of the foreign assistance budget. Members of the development community have long acknowledged that pooling and sharing resources may offer advantages to the U.S. development assistance program.

There is a pressing need to develop new national partnerships in international agriculture, ones that maximize the return to U.S. agriculture by coordinating the missions of our institutions. AID, USDA, other Federal agencies, universities, private institutions and producers can all benefit through improved cooperation [25].

Analysis of the complementary strengths and weaknesses of the different development actors reveals that, in many instances, potential for successful collaboration does exist and may provide a route to a more economical and effective development assistance program.

Constraints posed by certain elements of the AID structure, by dearth of interest on the part of universities and other development actors, and by competition and animosity among various organizations, have hampered past efforts to carry out collaborative ventures. AID has attempted to boost the capabilities of individual actors, but has not addressed the possibility of building complementary capacities necessary for joint undertakings. In fact, AID's efforts to establish separate entities to address each sector—the Board for International Food and Agricultural Development (BIFAD) to represent universities, the Private Enterprise Bureau to work with the private sector, and the Office of Private and Voluntary Cooperation to assist private voluntary organizations (PVOs)—without promoting efforts to link them, may hinder collaboration.

U.S. universities have successfully pooled their resources and skills to address a variety of domestic concerns, but few collaborative activities have been extended to the international domain. While linkages between universities and other development actors must in many cases be developed from scratch, a number of extant mechanisms and programs might support cooperative efforts between universities. Programs may have to be modified to stimulate cooperative efforts. Competition for development assistance contracts may not ensure access to sufficient expertise.

Successful collaboration between U.S. universities and other development actors will depend on a number of different factors including: magnitude of interest demonstrated by organizations, degree to which participants perceive joint efforts to contribute to their self-interest, and quality of incentives offered to participants. Initiating fruitful collaborative relationships will involve two important steps: 1) discerning when collaboration will prove beneficial and when it will prove ineffectual, and 2) developing mechanisms and incentives for organizational collaboration.

University-to-University Linkages

Some of the most successful university development work has been generated by university-to-university links. Collaborative Research Support Programs (see app. B), for example, commonly involve U.S. universities from different crop growing regions and with differing developing country experiences. This program operates on a wide range of agricultural production problems in most regions of the world.

Single universities often cannot provide the critical mass necessary for complex projects. Multi-institutional efforts in training and research can unite resources from a diversity of disciplines, experiences, and backgrounds. This type of collaboration is particularly valuable in an era when development assistance programs are leaning towards multidisciplinary approaches and solutions.

In addition to providing a broader spectrum of resources and, thus, improved university performance, joint university efforts can also generate political support for development assistance that single university undertakings sometimes undermine. Lack of understanding and visibility tend to limit the popularity of U.S. universities' international activities. Collaborative programs serve to reinforce each university's commitment to participation and performance. Cost sharing for international activities among universities also may appease constituents who otherwise fault U.S. universities' involvement in overseas work for attenuating resources that should be channeled to the universities' domestic responsibilities.

U.S. universities also benefit from sharing risks. Financial and personal risks involved with university participation in overseas work have increased due to factors such as political instability in countries and regions, international terrorism, and larger project size that calls for increased fiscal investments.

Developing countries have reacted favorably to contracts with multiple-university entities. Joining of university forces has often provided host countries with a large stock of resources and commonly permits more flexibility than contracts with single universities. Accessing the right mix of qualified staff at appropriate times has proved easier when host country governments have the reservoir of talent available under multiuniversity contracts.

Universities linked to consortia, and small institutions linked to larger ones, can benefit from pooling expertise and experience to win contracts. Internal reviews of collaborative projects also could lead to improved university performance. The Consortium for International Development (CID) has initiated a policy of reviewing all projects within the first year to identify and correct problems.

Collaborative efforts also may provide more effective predeparture orientations than single institutions tend to offer. Many universities have effectively administered training programs for a development project. AID has used the U.S. Department of Agriculture (USDA) to administer general training programs in agriculture and assigned a similar role to private firms in other areas. A broad collaborative effort could allow universities to participate in AID training in agriculture, natural resources, and environment. For example, a single training unit representing all five regional consortia could marshal a unique set of resources and link the educational systems of virtually every State.

Short training courses oriented to development assistance have been developed and offered without coordination except for the small number coordinated by USDA. CID has recently created a catalogue of short courses for its members. Analysis of that information indicates many opportunities to enhance performance and save money through greater collaboration, by merging courses, sharing resources, and reducing duplication.

Constraints on University Linkages

Constraints to multiuniversity development assistance activities vary according to the mechanism through which the universities are joined and the nature of the particular institutions involved. Certain problems, however, seem common to joint university work.

Diffusion of responsibilities and communication inherent in multiuniversity projects sometimes causes difficulty for donor agencies and participants. Donor agencies may have difficulty determining or assigning responsibility within development projects where several universities are involved. Confused channels of communication also lead to miscommunications between university participants.

Complexities in contracting have plagued multiuniversity arrangements. Most university participation in development assistance occurs under some form of contract or agreement with the donor agency. For a single university program, these arrangements generally are straightforward. Existing procurement/contracting processes for work with multiple organizations generally are designed for activities in which private sector firms serve as lead institutions and other organizations serve as subcontractors. Such processes do not support coequal collaborative efforts involving several universities working together.

Approaches Used in University-to-University Linkages

Universities in the past have formed various formal and informal linkage mechanisms to perform work together, including simple agreements, ad hoc membership in consortia, subcontracting activities to other universities, development of transitory or long-standing specific-purpose linkages, and formal consortia. Universities commonly base their joint work on simple agreements to work together on programs of common interest, such as Memoranda of Agreement or Understanding, which do not create an entity that can contract or implement programs on behalf of the partners.

Ad Hoc Membership in Consortia—Institutional agreements to facilitate access to individual staff members and to incorporate institutions into consortia on an ad hoc basis allow unique program resources to be shared. For instance, a number of institutions have benefited from Mississippi State University's seed technology program using this form of collaboration.

Subcontracting With Other Universities— Universities often enter into contracts to carry out a specific set of predefined activities related to an AID project, commonly in response to AID Requests for Proposals. While collaborative decisionmaking and management may occur, one partner tends to act as the prime contractor in legal/financial matters, subcontracting specific program elements to other institutions. In this way a combination of universities, tailored to the needs of a particular project, can contribute to an AID program [12].

Specific Purpose Collaboration—Long-standing specific-purpose networks of universities also exist to address particular development concerns. CRSPs have proved particularly successful specific-purpose collaborative arrangements. Further, the Consortium for International Crop Protection and the Farming Systems Support Project involve a number of universities that provide staff and other services to AID through a lead institution. The majority of the specific-purpose linkages are transitory, functioning for a defined period and subsequently dissolving [17].

Consortia—Formal consortia have been used mostly for implementation of development projects (see app. D). Although each of six such consortia has developed an individual management style, organizational structure, underlying philosophy, and disciplinary expertise, they share some features [12]. Each, for example, has a board of directors or similar mechanism by which university members direct the organization's activities as well as a central executive office and staff [17]. Most commonly, a consortium often assigns primary implementation responsibility to a single lead institution, while the other participating institutions contribute staff, training, and other inputs. In other cases, universities divide responsibilities among members by functions, such as training, or by subject matter or discipline.

Host governments identified university consortia as their preferred type of contractor in one analysis of alternative technical assistance delivery systems [12]. Host country government's would have difficulty replicating, let alone improving on, advantages offered by access to a number of high quality U.S. universities.

Linking Large and Small Universities—The major motivation for developing linkages between small and large universities is to help the smaller institutions build their capacities to participate in development assistance projects. Through these linkages, AID and universities also hope to ensure access to all relevant resources. To date, partnerships have aimed at pairing universities based on shared interest in the same substantive field.

AID and universities have used a variety of methods to support linkages between large and small institutions. CRSPs allow staff to be drawn from small as well as large universities. Many small universities also are members of consortia. Most historically black colleges and universities (HBCUs) are members of the Southeast Consortium for International Development [17]. Enactment of Title XII created a program whereby land-grant universities and HBCUs participate in Joint Memoranda of Understanding (JMOU); AID allocates funding to each partner to facilitate and enhance the involvement of each institution in future AID programs. Larger institutions sometimes engage HBCU partners to secure and implement a specific project—a practice that AID encourages. The Joint Memorandum of Understanding project was terminated in 1991, although a mechanism to continue support for HBCUs may be developed.

Several difficulties hinder linking small universities with larger ones. Large universities may lack an incentive to form binding relationships with smaller schools that may not already house desired resources or expertise, and may not vigorously pursue overseas opportunities with these institutions [51]. Larger institutions also may dominate smaller ones in collaborations, hindering HBCU faculty ability to influence decisions. Critics of the HBCU program believe the arrangement focuses too much on benefiting the HBCUs and does not necessarily take into account what is in the best interest of the larger universities, AID, and the developing country recipients. However, a review of the JMOU program found that the partnership approach has been beneficial to both groups of organizations and to AID [51].

University and International Agricultural Research Center Linkages

Much of the increase in agricultural production worldwide over the past two decades drew on the research and innovations of international collaborative networks, especially the International Agricultural Research Centers (IARCs). For example, much of the progress that has occurred in developing world agriculture—including some of the most famous breakthroughs, known collectively as the "green revolution"—can be largely attributed to the contributions of IARCs.

Since inception of the IARCs, U.S. universities have participated in their work. However, the basic philosophy for university involvement in IARCs has changed in recent years. Initial altruistic motivations have shifted to an emphasis on the potential for mutual benefits resulting from knowledge discovered at the IARCs. Growing emphasis on "reverse technology transfer" and a two-way flow of information in international agricultural research has revealed many areas of mutual interest and opened up possibilities for sharing techniques and resources between the United States and lesser developed countries (LDCs). This change in U.S. philosophy has broadened the rationale and expanded the possibilities for U.S. university/IARC linkages [cf: 25].

The United States has a vested interest in many of the major crops studied by the IARCs (table 4-1). Wheat, maize, sorghum, beans, cowpeas, rice, and barley serve as staples to U.S. and LDC agriculture. U.S. and LDC scientists seeking answers to problems on the same crop or facing similar agroecological conditions have a strong basis for conducting cooperative research activities: agronomic techniques developed for one area of the world can often be applied to another. Texas has a black soil region, for example, similar to regions in Africa and Asia. IARCs present a forum in which mutually beneficial joint activities can take place.

IARCs also serve as repositories for germplasm, the genetic resources that serve as the building blocks for many cultivars. Scientists from the United States and across the world draw on these genetic resources and constantly look for new sources of variation to integrate into ongoing programs. Through IARCs, U.S. universities have shared useful knowledge about genetic resources with other organizations and benefited from new information from these organizations.

U.S. university participation in the IARCs also helps promote global flow of knowledge attained through scientific research. IARCs foster international exchange of information and knowledge among a worldwide network of scientists. In addition to research requiring direct collaboration among international colleagues, IARCs sponsor conferences and workshops that also foster the flow of knowledge. Thus, a U.S. scientist working at a center has multiple opportunities to interact with counterparts from all areas of the world.

The relationship between U.S. universities and IARCs has a synergistic and self-perpetuating quality. Increased university collaboration with IARCs contributes to the internationalization of U.S. uni-

Table 4-1—Primary Foci of International Agricultural Research Centers[a]

Acronym	Center	Location
Specific commodities:		
AVRDC	Asian Vegetable Research and Development Center	Taiwan
CIAT	International Center for Tropical Agriculture	Colombia
CIMMYT	International Maize and Wheat Improvement Center	Mexico
CIP	International Potato Center	Peru
ILCA	International Livestock Center for Africa	Ethiopia
ILRAD	International Laboratory for Research on Animal Diseases	Kenya
INIBAP	International Network for the Improvement of Banana and Plantain	France
IRRI	International Rice Research Institute	Philippines
ITC	International Trypanotolerance Center	Gambia
WARDA	West Africa Rice Development Association	Liberia
Geographical areas:		
CARDI	Caribbean Agricultural Research and Development Institute	Trinidad
CATIE	Center for Tropical Agricultural Research and Training	Costa Rica
ICARDA	International Center for Agricultural Research in the Dry Areas	Syria, Lebanon
ICRISAT	International Crops Research Institute for the Semiarid Tropics	India
IITA	International Institute of Tropical Agriculture	Nigeria
Agricultural inputs:		
IBPGR	International Board for Plant Genetic Resources	Italy
ICIPE	International Centre for Insect Physiology and Ecology	Kenya
IFDC	International Fertilizer Development Center	United States
Natural Resource Systems[b]		
IBSRAM	International Board for Soil Research and Management	Thailand
ICLARM	International Center for Living Aquatic Resources Management	Philippines
ICRAF	International Council for Research in Agroforestry	Kenya
IIMI	International Irrigation Management Institute	Sri Lanka
Food and Agricultural Policy		
CABI	Commonwealth Agricultural Board International	United Kingdom
IFPRI	International Food Policy Research Institute	United States
ISNAR	International Service for National Agricultural Research	Netherlands

[a] Some IARCs are sponsored by the Consultative Group on International Agricultural Research.

[b] Two new international tropical forest research centers, based in Costa Rica and Indonesia, have been proposed.

SOURCE: Developed, in part, from information presented in Consultative Group on International Agricultural Research, The Secretariat, "Sustainability Research in the CGIAR—Its Status and Future," Agenda Item No. 9 of Consultative Group Meeting held May 29-June 2, 1989, Canberra, Australia (Washington, DC: CGIAR, 1989).

versities. This will, in turn, spur future involvement of university staff members in IARC activities.

U.S. universities already play a major role in training IARC researchers. A 1984 survey of staff at several Centers revealed that 48 percent of their researchers received their most recent degrees from U.S. universities; 90 percent of those degrees were awarded by U.S. land-grant institutions [9]. IARCs also provide foreign students pursuing graduate degrees at U.S. universities with a forum to conduct research relevant to their LDC field of interest—opportunities that may not exist at the U.S. university. Participating in the training of these LDC students also contributes to development of the future capacity of host country national agricultural research institutions where many students later work. Thus, linkages between U.S. universities and

IARCs offer benefits to the individuals involved today, and strengthen the future of international agricultural research.

Constraints to University/IARC Collaboration

IARC and university staff have identified few constraints to the formation of additional university/IARC linkages. Some IARC personnel view research as their central objective and believe that training programs waste IARC researchers' time and resources; one solution might be to link the theses of graduate students being trained at IARCs to particular IARC projects, thereby making their training beneficial to the research objectives of the centers.

A more critical constraint seems to be lack of financial support for U.S. scientists to participate in IARC programs. By one estimate, for every dollar contributed to IARC budgets, certain European governments allocate 3 dollars to link their scientists to the Centers; the United States devotes 3 cents for each dollar contributed [25]. A program specifically designed to encourage and support participation of U.S. scientists in IARC collaboration may be required.

Approaches Used in University/IARC Linkages

Extensive collaborative links exist between the international centers and U.S. researchers, the majority of whom work at U.S. universities [9]. U.S. university staff work collaboratively with IARCs in each category of activity in which IARCs carry out collaborative work:

- *Research contracts* commonly formalized and funded by an external donor (frequently AID), allows universities to assist IARCs by contributing expertise in a particular area or towards a specific task.
- *Noncontract research collaboration* includes a wide variety of activities, from the exchange of germplasm for reciprocal screening to conduct of formal, joint studies through visits or long-distance communication.
- *Research cooperation* facilitates continuing correspondence and interaction to plan research programs. Cooperation may develop into more formal activities.
- *Personnel exchanges* include sabbatical leaves in both directions and shorter forms of exchanges.
- *Training activities* fall into two general categories: 1) training courses for researchers and technicians from developing countries conducted at U.S. universities, and 2) degree-related student research projects, involving U.S. and LDC students, jointly administered by IARCs and universities.
- *Information exchange* includes joint publication and sharing of research databases or other documentation programs.
- *Other informal collaboration* includes a wide variety of activities, generally short-term, such as professional meetings, workshops, and planning or review panels.

AID has three programs specifically designed to encourage and support linkages between U.S. institutions and IARCs: Collaborative Research on Special Constraints, Scientific Liaison Officers Program, and CRSP/IARC Linkages. In addition to continued support for these programs, two relatively inexpensive opportunities exist to increase collaboration between IARCs and U.S. researchers.

Collaborative Research on Special Constraints—This relatively new program is intended to solve short-term problems that may be blocking technological breakthroughs at the centers by allocating 2- to 3-year grants of approximately $50,000 a year for collaborative research between scientists at U.S. institutions and at IARCs. This approach already has proved cost-effective [53], and might beneficially be expanded.

Scientific Liaison Officers Program—AID identifies individual U.S. researchers to serve as Scientific Liaison Officers to IARCs to improve linkages to the U.S. scientific community and to strengthen technical exchange between the centers and AID. The liaison officers help IARC researchers contact U.S. scientists conducting relevant research and assist U.S. researchers in establishing contact with center staff. Liaison officers are selected on the basis of professional excellence and interest in the research of the center for which they have been chosen; they make annual visits to the centers they represent, and serve as resource persons to AID personnel.

CRSP/IARC Linkages—AID encourages research linkages between CRSPs and relevant IARCs. In some cases, IARCs and CRSPs form linkages based on existing areas of common interest, in others, AID has prompted CRSPs to seek center researchers to participate in joint planning conferences and serve on evaluation panels.

Post-doctoral Fellowships—AID could support post-doctoral fellowships for U.S. researchers at IARCs with relatively little additional funding. Many post-doctoral fellows move into senior researcher positions either at the same center or elsewhere in the system. For example, nearly 70 percent of the Rockefeller Foundation Social Science fellows remain in the Consultative Group on International Agricultural Research system. At approximately $33,000 per post-doctoral year, $1 million would provide opportunities for 30 scientists to come to the Centers.

Small-Scale Collaborative Linkages—Despite shared interests, lack of funding commonly constrains the number of collaborative activities occurring between personnel at the international centers and their U.S. colleagues. Small amounts of money, perhaps $5,000 to $20,000 a year, can support a graduate student working on a project of mutual interest, provide resources for a series of germplasm screening tests, or allow joint trials that require travel funds. For a cost of $1 million, 50 to 200 activities could thus be supported. If treated as an augmentation to the core IARC contribution, these would require little managerial overhead.

University/Private Sector Linkages

Private sector participation in international development assistance is one of AID's four main objectives. This created interest in promoting linkages between U.S. universities and private sector organizations. The term "private sector" remains ambiguous, however, and has been defined to encompass a wide range of establishments. Different private sector entities play differing roles in the U.S. economy, have varied motivations for participating in the U.S. foreign assistance program, and develop distinct types of relationships with U.S. universities. For the purposes of this report, private sector has been defined to include three groups: private voluntary organizations, private consulting firms, and agribusiness firms. In order to address the distinct issues involved in their linkages with U.S. universities, each of the groups will be treated separately.

University/Private Voluntary Organization Linkages

Private voluntary organizations (PVOs) have broadened their capabilities in recent years, simultaneously competing with and offering U.S. universities new opportunities. Due to a shift in philosophy as well as congressional mandates to include PVOs in the development process, PVOs have shifted their major emphasis from disaster relief and food aid to development assistance [113]. PVOs now play a substantial role in development assistance work, administering at least $1.2 billion in annual aid to developing nations, some of which is supported by AID.

A number of factors have contributed to AID's increasing reliance on PVOs. Despite heterogeneity in the PVO community, many have emerged as sophisticated, well-organized development assistance actors. They are employing growing numbers of professional staff and forming long-term, strategic outlooks. PVOs have also expanded the range of LDC nongovernmental organizations with whom they interact [104]. Thus, PVOs have developed into a strong constituency for foreign assistance. As a result, despite apparent complementarities of university and PVO functions and the potential benefits of forming collaborative university/PVO relationships, competition for congressional funding generally characterizes the university/PVO relationship. Financial or programmatic incentives to members of both communities are probably necessary if successful university/PVO collaboration is to evolve.

Moreover, PVOs and universities tend to reach out to different echelons of LDC societies. PVOs tend to focus on "bottom-up" or grassroots strategies, emphasizing developing capacities for action at the local level to solve local problems. Universities, on the other hand, tend to work from the top down, focusing most of their work at ministerial or institutional levels. Because PVOs commonly engage in short-term projects disconnected from mainstream institutional development, many of their innovations are not applied to other problems or replicated by other organizations.

However, PVOs are increasingly called on to plan, administer, and carry out large-scale development projects; universities are simultaneously searching for new ways to participate in AID's development efforts. Thus, both communities are carrying out extensive policy and program evaluations. These simultaneous searches for new development assistance approaches may provide an opportunity for PVOs and universities to consider more joint endeavors.

Members of both communities have recognized the potential benefits of carrying out cooperative activities and have expressed interest in pursuing that potential. A 1984 AID-commissioned survey of 180 PVOs and 120 universities revealed that both groups value their previous collaborative efforts, which mainly entailed PVOs hiring university consultants to carry out specific tasks [44]. The survey also indicated that the two communities shared priorities in a number of areas, including: agriculture, rural development, livestock development, health, and water and sanitation.

Recent cutbacks in Federal development assistance have affected both communities. An alliance between the two groups could strengthen their ability to influence Congress and increase public support for development work.

While university and PVO approaches represent different development assistance philosophies, they could prove to serve highly complementary functions. Through combined efforts, universities and PVOs could extend their assistance to an even broader spectrum of LDC populations. Although universities have made some major technological breakthroughs, they have been repeatedly criticized for failing to disseminate new knowledge and information to local populations. PVOs might provide an effective vehicle for transporting useful knowledge from the generating institutions—including universities—to the people who can implement it. University/PVO collaboration could lead to adoption of successful PVO methods by universities in their long-term development activities. Concomitantly, PVOs could benefit from university expertise in development of training skills.

Staffing problems have afflicted universities working in development in the past. Many projects require long-term staff participation, while university personnel generally are unable to commit to such activities for extended periods of time. PVOs could enlist university personnel for short-term assignments on their projects. This type of arrangement would benefit PVOs by providing them with the specific expertise they need, and would benefit universities by broadening the universities' international experience without depriving the university community of valued personnel for extended periods of time. Such assignments also would fit well into the academic calender, which restricts the availability of faculty members for overseas assignments.

Constraints to U.S. University/PVO Linkages—Despite potential successful university/PVO collaboration, a number of constraints stand in the way of such linkages. Basic philosophical differences exist between PVOs and universities. The typically conservative nature of universities tends to conflict with the generally untraditional nature of PVOs. While PVOs tend to be proactive and action-oriented, universities are more often reactive and response-oriented. These philosophical differences have led to the development of friction between the PVO and university communities. Universities often question the effectiveness of PVO efforts, because they view the size of and scope of PVO efforts as inadequate and unlikely to result in lasting change [11]. On the other hand, PVOs have questioned the relevance of university staff knowledge and expertise to developing country conditions and have criticized university projects for failing to address the needs of the "poorest of the poor."

AID has done little beyond organizing several pilot projects to stimulate PVO/university cooperation. Structurally, the agency treats the university and PVO communities as separate development actors operating in unrelated spheres. AID sponsors advisory groups to each community—Advisory Council for Voluntary Foreign Assistance (ACVFA) for the PVOs and BIFAD for the universities—that operate independently with little interaction. While AID has provided guidance to help PVO groups strengthen their capabilities, and Title XII provided strengthening grants and other mechanisms to improve university performance, the agency has not organized efforts to promote a collaborative relationship between the two groups. Specifically, no funding mechanisms exist to support university/PVO activities, and the two groups have not managed to communicate the benefits of past collaboration successfully to AID. Because successful university/PVO linkages will depend on AID's support, little progress will be made in this area until AID recognizes the value of this type of cooperation.

Approaches Used in U.S. University/PVO Linkages—U.S. universities and PVOs have had little experience working together in international development activities. The Center for PVO/University Collaboration in Development was established by Western Carolina University in 1979 to encourage and institutionalize collaboration between PVOs and Appalachian universities to address rural poverty. The participants perceived a number of commonalities between the problems of rural poverty in the United States and in developing nations, and saw the value of applying solutions developed in response to problems in one region elsewhere.

Based on meetings focused on involving PVOs concerned with the environment and natural resources in collaborative efforts with the universities and AID, BIFAD established a Standing Committee on Sustainable Agriculture in 1989. Composed of representatives from all three groups, the committee currently is developing a National Agenda for Promoting Sustainable Agriculture in Developing Countries. In addition, AID is supporting a number of university/PVO pilot projects to explore the effectiveness of this type of broad cooperation.

Because so few examples of university/PVO collaboration exist, initial efforts to improve university/PVO collaboration could involve an AID-organized meeting between the agency and representatives of the PVO and university communities. Substantive discussions might assist AID in determining the types of activities best suited for collaboration and the types of incentives needed to foster that collaboration. Collaboration will likely work best in cases where universities, PVOs, AID, and LDC organizations work as partners from project design and planning throughout project implementation.

CRSPs may also provide a forum for university/PVO collaboration. While CRSPs have been cited as effective examples of AID-supported university programs, they have been criticized for lacking extension elements. PVOs—recognized for their success in extension activities—could contribute these strengths to the CRSPs, ensuring the broad dissemination of CRSP-obtained research and technology.

AID could establish a clearinghouse to facilitate communication among AID, universities, and PVOs [cf: 110]. A successful clearinghouse would provide PVOs with technological support and universities with useful evaluations of PVO experiences in implementing university-generated technology.

The greatest opportunity for forming university/PVO linkages may be in training. Poor or inadequate training programs often hinder the performance of PVO personnel working in developing nations. U.S. universities could be enlisted to train PVO staff and indigenous nongovernmental organization staff, thereby distributing the benefits of a widely recognized university strength. Concomitantly, PVOs could train university personnel in development of grassroots collaboration.

Universities and PVOs also could explore the possibilities of creating links between LDC alumni of U.S. universities and PVOs within those LDCs. These alumni, knowledgeable about the host country and likely to be familiar with the philosophies backing the western organizations, could provide a valuable resource for PVOs.

University/Private Consulting Firm Linkages

Significant collaboration currently occurs between U.S. universities and private consulting firms working on AID-supported international development projects. Of 141 Title XII projects identified by BIFAD in 1988, private firms participated in some capacity in 23 percent of the contracts, leading 11 percent of the activities and serving as subcontractors in the remaining 12 percent [79].

Private consulting firms present universities with their most rigorous competition for development assistance projects, reflecting the overlapping functions of private firms and universities working in this field. Tightening of AID's budget, the change in its project portfolio, AID's increased emphasis on short-term results, and growing emphasis on private sector development in the past decade have all led to an increased reliance on private sector firms in AID's international work. Private firms now often replace universities as contractors. These factors have contributed to antagonism between universities and private firms.

Increasing the number of university/private firm linkages could provide an avenue for reinvolving universities in development assistance work while maintaining the current focus of the development assistance program. As the funds available for development assistance work diminish and competition over the available funds increases, the expansion of university/private consulting firm linkages could also present a cost-effective method for accessing the best resources of these two development actors.

Universities and private consulting firms have complementary resources and strengths and, through joint undertakings, might be able to compensate for each other's weaknesses. While universities' low staff turnover rates tend to bring an element of long-term stability to their work with AID, universities sometimes lack the staff with the expertise necessary to carry out specific tasks or to work on individual projects. Regular full-time university staff fill about 62 percent of long- and short-term overseas technical assistance positions in Title XII projects [80]. Private firms, which tend to hire particular staff members to work on specific projects, could help fill personnel gaps in these projects.

Private firms have shown strengths in certain areas of development assistance work including: private sector development, technical assistance to business activities, and short-term technical assistance. Because private firms engaged in development assistance activities are highly dependent on AID for survival, they have also learned cost-effective, efficient management methods. Collaboration between universities and private firms could help universities conduct their development assistance in the results-oriented manner that AID prefers.

Constraints to U.S. University/Private Consulting Firm Linkages—The current competition and antagonism between U.S. universities and private consulting firms serves as the strongest deterrent to forming increased linkages between the two. With the implementation of Title XII set-asides, bad feelings developed between universities and private firms. Firms have argued that the set-asides create an "uneven playing field," ensuring universities with easy access to AID contracts. Similarly, because firms often hire ex-AID employees, universities view private firms as having an inside track for winning bids.

Areas of competitive overlap—such as extension activities and economic policy analysis—exacerbate this rivalry. Because a number of firms have expanded their portfolios in response to the decline in funding and limited opportunities, universities and private firms find themselves competing over more and more projects.

Universities and private consulting firms do work together when they view collaboration as mutually beneficial. University/private firm linkages will likely continue to form in these cases, particularly given the increased complexity and size of AID projects. While expanded university/private firm linkages would likely offer AID and developing countries access to improved resources, a formal collaboration program does not seem to offer many benefits to either universities or private firms and thus may not facilitate university/private firm linkages.

Approaches Used in U.S. University/Private Consulting Firm Linkages—The most common mechanism employed in forming university/private firm linkages, the contract-subcontract relationship, specifies the demands expected from and the benefits anticipated by each party involved. Because of their honed management skills, experience in project implementation, and cost-effective methods for winning proposals, private firms tend to be effective lead contractors. They apply these skills particularly effectively when carrying out short-term projects. Universities are perceived as more effective prime contractors on long-term projects that comply with their traditional strengths, such as institution-building activities.

Universities and private firms currently share certain personnel through various informal mechanisms. Because university and private firm staff members are often recruited from the same places, lines sometimes blur between the two entities. University staff often play short-term advisory roles at firms, and private firms often hire university specialists, particularly economists, to work on their development projects.

Increasing exchange of personnel between universities and private consulting firms may facilitate collaboration between the two groups. Homestays at private firms by university personnel, and vice versa, could provide means to educate staff from one entity on the techniques employed by the other. Staff sharing, however, previously has led to some discomfort on the part of universities. Private firms usually can offer the financial incentives necessary to enlist the assistance of the specific university staff members needed to meet the demands of their contracts. Universities tend to resent private firms tapping into their resources in this manner without fully involving the universities in those contracts [43].

AID efforts to promote collaboration between universities and private consulting firms may require little more than support for open competition for projects or specification of preference for collaboration in AID's Request For Proposals. Both methods require AID to match the strengths of each private firm and university with the particular demands of individual projects.

A Title XII-type mechanism may prove advantageous for projects that fall into universities' field of comparative advantage, such as long-term institution-building activities. The proposed Institutional Linkages program is designed, in part, to accomplish this. AID could maximize the use of open competition as a means of finding the best contractor in cases where no candidates have inherently superior strengths, but simultaneously universities could be ensured access to the types of projects for which they are best equipped.

Increased use of AID contracts that specify the desire for joint university/private firm activities may provide another means for fostering collaboration in AID projects that would benefit from the involvement of both a university and a private consulting firm. For example, private sector development projects that also have training components would likely benefit from joint participation.

Awarding joint study grants to universities and private consulting firms also may provide an effective method for contributing to the available development literature. Private firms perform the majority of AID project evaluations and, therefore, serve as reservoirs of knowledge on past AID projects. Universities have the capacity to synthesize that knowledge and develop it into more generally applicable theory. The entire international development community could benefit from collaborative efforts geared at creating improved frameworks and hypotheses for understanding past development efforts and improving future ones.

University/Agribusiness Linkages

U.S. agribusiness experience working in Third World countries has been scant, as are examples of U.S. university/agribusiness collaborations in development assistance projects. Despite the growing emphasis on integrating the private sector into AID's development work, the resources of U.S. agribusiness largely remain untapped. The dearth of agribusiness participation in AID's development assistance activities can be attributed largely to two factors: agribusiness firms' inability to see a place for themselves in development assistance, and AID's difficulty conceptualizing and developing a direct, meaningful relationship with agribusiness.

Universities and agribusiness have worked together effectively on the domestic front and may be able to transfer that collaboration abroad successfully. Private businesses have played a role in determining the research agenda at universities and then providing support for that research. Private firm representatives serve on university advisory committees and governing boards, and agribusiness firms frequently participate in university conferences.

For example, U.S. universities and domestic agribusiness firms recently launched the National Agribusiness Education Development Project with the support of USDA. This project, sponsored by 30 agribusiness firms, aims at encouraging the creation of a model masters degree curriculum and developing a new way to deliver agribusiness education. The project should offer benefits to both communities: for agribusiness, it provides an approach to help narrow the gap between the demand for professional agribusiness managers and the supply of trained graduates; for universities, the project shows agribusiness support for academic programs jointly managed by colleges of agriculture and of business. Thus, universities and agribusiness have found ways to provide advantages to both communities through collaboration; the international sphere may provide similar opportunities for mutual gains.

Although potential for successful collaboration between U.S. universities and agribusiness firms exists, development assistance activities suitable for agribusiness participation are few. The range of activities for U.S. university/agribusiness collaboration in development assistance activities, is even more narrowly defined.

With decreasing funds allocated to development assistance activities and increasing emphasis on private sector involvement in these efforts, AID has expressed increasing interest in involving agribusiness firms in its development assistance work. Among the possibilities envisioned by the agency is the development of joint activities that require a mix of the type of skills that the two entities have to offer. Agribusiness firms offer capital resources in the form of investment and credit, the provision of goods and services, management acumen and business skills, and an ability to market advanced technology through licensing and R&D work. Many of these strengths could complement the traditional activities carried out by U.S. universities.

University/agribusiness collaboration might help to eliminate some of the tensions between these two communities based on commodity group pressure.

Some agribusiness firms have viewed U.S. university efforts in developing nations as detrimental to the firm's business activities, particularly in cases where the university work contributes to LDC production of a crop that could provide competition for U.S. producers. An emphasis on collaboration between universities and agribusiness in development assistance could reduce this friction.

By participating in the development assistance process, agribusiness firms may hasten their access to the profits available from Third World markets. Growth and profitability of U.S. agribusiness largely depends on the development of LDC markets for U.S. products. Hastening the development process will provide them with quicker access to these new consumers.

Constraints on University/Agribusiness Linkages

A primary obstacle to U.S. university/agribusiness firm collaboration is difficulty reconciling the contradictory qualities of business oriented agriculture firms with academically oriented universities. The profit nature of agribusiness, and its potential to skew a private firm's ability to act as an objective partner, has often appeared contrary to traditional development assistance objectives and incompatible with the philosophies of AID and the universities participating in this type of work.

International development assistance is not the primary concern or activity of agribusiness firms, as it is with many of the private sector organizations examined earlier. Because these firms do not consider development assistance a priority, much of the competition afflicting university relationships with other development actors does not exist in the university/agribusiness relationship. However, promoting university-agribusiness linkages likely will require powerful incentives.

Approaches in University/Agribusiness Linkages

Universities and agribusiness have had a short history of collaboration in AID-supported development activities. Two agribusiness associations fund individual land-grant university faculty to demonstrate techniques for improving livestock and aquaculture production in developing countries, with the expectation that increased U.S. sales of feed grains will result from this project.

A livestock development project in Belize shows how AID was able to enlist university/agribusiness collaboration in development assistance. Subsequent to successful lobbying of AID by the U.S. Feed Grains Council (USFGC), the terms of the government bidding process specifically required university/agribusiness collaboration. State-level affiliates of USFGC participate in the funding and selection of technical assistance projects conducted by land-grant faculty and staff. University/agribusiness cooperation achieved scant success with this project because some universities participating in the project interpreted the instructions to mean they could hire individual agribusiness personnel rather than develop a joint university/agribusiness endeavor.

The American Soybean Association/AID Liaison Committee was first established as a means to ease tensions among soybean producers, universities, and AID; however, it has evolved into a mechanism for promoting development cooperation. The committee identifies projects that mutually assist LDCs and the U.S. soybean industry [24]. Although still strongly opposed to publicly funded, production-oriented agricultural aid, the Association has developed into a positive force for economic development in developing nations relative to many other U.S. farm groups [60].

Successful university/agribusiness collaboration will depend on identifying the regions and the types of economies best suited for the type of collaborative activities these actors wish to undertake. AID's Asia and Near East Bureau has shown a distinct interest in pursuing agribusiness involvement in their development work, identifying one of its highest priorities to be strengthening collaboration between U.S. agribusiness and AID to develop new markets and investment opportunities.

AID, universities, and agribusiness will need to work together to determine where university/agribusiness collaboration would prove most successful. The best areas for university/agribusiness collaboration may lie in advanced developing countries where the infrastructure for private sector development and profit motives for agribusiness participation already exist. The types of projects suited for joint undertakings might enlist universities to provide project analysis, training, education, and technological support and engage agribusiness to build processing or waste management facilities and to lead the management and marketing systems.

AID established the Bureau for Private Enterprise (AID/BPE) to facilitate access to private sector expertise. Working with AID/BPE and BIFAD, AID could establish an advisory committee to examine mechanisms for promoting and directing university/agribusiness cooperation. The U.S. Department of Agriculture (USDA), and particularly the Private Sector Relations Division of its Organization for International Cooperation in Development, could promote similar discussions.

AID may not prove the best candidate for organizing joint endeavors between universities and agribusiness; USDA may prove a better facilitator of university/agribusiness collaboration. First, USDA and agribusiness have a long history of working together; they are comfortable with each other and familiar with each other's policies. Second, unlike AID and agribusiness, USDA and these firms tend to share many of the same objectives. This shared philosophy may promote a more compatible working relationship.

University/Federal Agency Linkages

Although the primary channel of U.S. university involvement in development assistance has been through the Agency for International Development, other Federal departments and agencies have international offices active in international agriculture, natural resources, and environmental affairs. Many of these have established cooperative arrangements with AID.

Among the relevant offices are: USDA's Office for International Cooperation in Development and Foreign Agriculture Service, the Forest Service's Office of International Forestry and Forestry Support Program, the Environmental Protection Agency's Office of International Activities, and international offices of the Department of the Interior (e.g., National Park Service, Fish and Wildlife Service) and National Oceanic and Atmospheric Administration. These offices historically are small and marginal to the primary mandate of their own institutions, but they may expand their efforts with the increasing international concern over sustainable agriculture and environmental issues, and streamlining of AID activities.

USDA has long had a close relationship with U.S. land-grant universities (and through them, to U.S. agribusiness) related to domestic agricultural and, more recently, natural resource and environment teaching, research, and extension. It also has had authority since 1977 to participate in multi-institutional international research and extension, and to strengthen U.S. colleges and universities to help them participate in this collaboration (see box 4-A).

Thus, USDA's support for international agricultural and environmental activities could be expanded, especially in those areas that provide clear benefit to the United States. It is becoming increasingly clear that, to remain economically competitive and environmentally sound, U.S. agriculture will need access to new crop varieties, new pest and disease control materials and techniques, and new information on the workings of various agroecological systems.

For example, USDA, U.S. universities, and overseas institutions might found new Collaborative Research Support Programs (CRSPs) to investigate crops of mutual importance. The eight extant CRSPs have provided substantial benefits to the supporting countries, including the United States. For example, nearly every commercial sorghum variety sold in the United States is derived from varieties developed through the Sorghum and Millet CRSP. The Bean and Cowpea CRSP used germplasm from developing countries to develop bean varieties that have generated approximately $12,960,000 for Michigan farmers alone [25]. Similar collaborative programs could be established for research on other major commodities.

USDA might increase support for scientists from U.S. universities to conduct collaborative research at International Agricultural Research Centers and through other international research and development networks (e.g., the International Biotechnology Collaboration Program). As previously noted, AID does not match its core contribution to the IARCs with funding for participation in IARC activities. This participation provides U.S. scientists exposure not only to knowledge and research results generated by the Center, but also to the work of visiting scientists from Europe and elsewhere.

However, to date USDA has devoted little effort and resources to international agriculture. According to one estimate, USDA invests no more than 1 percent of its research funds annually in international agricultural research activities; less than 25 researchers and 100 counselors and agricultural attaches are posted overseas to implement USDA

Box 4-A—Current Legislative Authority for USDA Support of International Agricultural Research, Extension, and Technical Assistance

Public Law 95-113: National Agricultural Research, Extension, and Teaching Policy Act of 1977, as amended[1]:

SEC. 1458. INTERNATIONAL AGRICULTURAL RESEARCH AND EXTENSION

(a) AUTHORITY OF THE SECRETARY.—To carry out the policy of this subtitle, the Secretary (in consultation with the Agency for International Development and subject to such coordination with other Federal officials, Departments, and agencies as the President may direct) may—

(1) expand the operational coordination of the Department of Agriculture with institutions and other persons throughout the world performing agricultural and related research and extension activities by—

(A) exchanging research materials and results with the institutions or persons; and

(B) conducting with the institutions or persons joint or coordinated research and extension on problems of significance to food and agriculture in the United States;

(2) enter into cooperative arrangements with Department and Ministries of Agriculture in other nations to conduct research, extension, and education activities in support of the development of a viable and sustainable global agricultural system, including efforts to establish a global system for plant genetic resources conservation;

(3) enter into agreements with land-grant colleges and universities, the Agency for International Development, and international organizations (such as the United Nations, World Bank, regional development banks, the International Agricultural Research Centers), or other organizations, institutions or individuals with comparable goals, to promote and support the development of a viable and sustainable global agricultural system;

(4) further develop within the Department highly qualified and experienced scientists and experts who specialize in international programs, to be available to carry out the activities described in this section;

(5) work with transitional and more advanced countries in food, agricultural, and related research, development, and extension (including providing technical assistance, training, and advice to persons from the countries engaged in the activities and the stationing of scientists and other specialists at national and international institutions in the countries);

(6) expand collaboration and coordination with the Agency for International Development regarding food and agricultural research, extension, and education programs in developing countries;

(7) assist colleges and universities in strengthening their capabilities for food, agricultural, and related research and extension that is relevant to agricultural development activities in other countries through—

(A) the provision of support to State universities and land-grant colleges and universities to do collaborative research with other countries on issues relevant to United States agricultural competitiveness;

(B) the provision of support for cooperative extension education in global agriculture and to promote the application of new technology developed in foreign countries to United States agriculture; and

(C) the provision of support for the internationalization of resident instruction programs of the universities and colleges described in subparagraph (A); and

(8) establish, in cooperation with the Secretary of State, a program, to be coordinated through the International Arid Land Consortium, to enhance collaboration and cooperation between institutions possessing research capabilities applied to the development, management, and reclamation of arid lands.

(b) ENHANCING LINKAGES.—The Secretary shall draw upon and enhance the resources of the land-grant colleges and universities, and other colleges and universities, for developing linkages among these institutions, the Federal Government, international research centers, and counterpart agencies and institutions in both the developed and less-developed countries to serve the purposes of agriculture and the economy of the United States and to make a substantial contribution to the cause of improved food and agricultural progress throughout the world.

(c) PROVISION OF SPECIALIZED OR TECHNICAL SERVICES.—The Secretary may provide specialized or technical services, on an advance of funds or a reimbursable basis, to United States colleges and universities and other nongovernmental organizations carrying out international food, agricultural, and related research, extension, and teaching development projects and activities. All funds received in payment for furnishing such specialized or technical services shall be deposited to the credit of the appropriation from which the cost of providing such services has been paid or is to be charged.

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[1] Authorization for international agricultural research, extension, and collaboration was established in the National Agricultural Research, Extension, and Teaching Policy Act of 1977 (Public Law 95-113) and was substantially amended by the Agriculture and Food Act of 1981 (Public Law 97-98, sec. 1436), the Food Security Act of 1985 (Public Law 99-198, sec. 1418), and the Food, Agriculture, Conservation, and Trade Act of 1990 (Public Law 101-624, sec. 1613).

activities. In contrast, France's Center for International Agricultural Research and Development disseminates nearly 800 professionals worldwide [25]. Expanding USDA's international activities thus is likely to require expansion of international office staff and new funds.

In response to the 1990 reauthorization of USDA programs to strengthen the international capacities of State universities and land-grant colleges, USDA and the U.S. universities, under the leadership of the National Association of State Universities and Land Grant Colleges, are proposing a $25 million International Agriculture Program Initiative (IAPI). The goal of IAPI is "to promote international research, extension, and higher education programs in the U.S. self-interest and to bring the economic benefits of international work to U.S. farmers" [48]. Key components of IAPI fall in four primary areas.

- *Research*—strengthening international research capacity of land-grant university scientists, grants for research relevant to international competitiveness of U.S. agriculture, and funding to conduct collaborative international agricultural research.
- *Extension*—expand bilateral technical assistance and promote application of new technologies developed overseas to U.S. agriculture.
- *Higher Education*—expand curricula and support faculty and graduate participation in international food and agricultural endeavors.
- *National Agricultural Library*—expand collection and transmission of international agricultural information relevant to U.S. agricultural competitiveness.

The proposal currently is under consideration by university, commodity, and congressional groups.

NEW DIRECTIONS FOR UNIVERSITY PARTICIPATION IN DEVELOPMENT ASSISTANCE

Since shifting its direction for development assistance, AID also has identified additional development needs and opportunities that may offer new opportunities for university involvement. These include: 1) sustainable agriculture and natural resources management, and 2) links with advanced developing countries and attention to second generation problems of institutions.

Sustainable Agriculture and Natural Resources Management

Sustainable agriculture and natural resources management have received heightened AID attention in the past few years. Sometimes the two are addressed separately and sometimes together. Their growing importance can be seen in the Plan for Supporting Natural Resources Management and the Natural Resources Management Support project for Sub-Saharan Africa; the environment and natural resource strategy for Central America; the BIFAD Task Force on both issues; the current Asia and Near East Bureau's development of a natural resource management strategy; and the S&T Office of Agriculture review of its strategy.

Obligations for this work are not well documented, but appear to have increased since the 1970s and may have reached a plateau for the immediate future. International attention to these two areas continues to increase, implying that obligations for this work may not be keeping pace. While activities and funding for these areas have increased, it is not clear to what extent universities can benefit. A number of factors may limit their involvement:

- Only a small number of U.S. schools are perceived to have the expertise to perform sustainable agriculture and natural resources management technology research and transfer in a developing country context [8].
- AID's focus is no longer on research nor the type of large-scale institution-building that universities have contributed to in the past. Much of AID's work is geared to PVOs and nongovernmental organizations, in part because they also have relevant expertise and also because AID hopes to leverage their funds for this work. (The Bureaus for Africa and for Latin America and Caribbean stress the role of nongovernmental organizations in their environment and natural resource strategies.)
- Title XII has done little to promote university involvement in environment and natural resources [78].

AID's new Environment Initiative and BIFAD's recent establishment of the Standing Committee on Sustainable Agriculture reflects a growing interest in AID and the U.S. university community in environmental and natural resource issues. Still, much of AID's increased work is seen as responding to proactive private organizations. Environmentally sustainable development issues are of growing concern to many contemporary development actors within the university and PVO communities. U.S. universities and PVOs have separately carried out a number of activities involving natural resource management in the past. University/PVO collaboration may serve as an effective means for addressing environmental issues.

University development of proposals for university involvement, and for building the capability to carry out natural resource and environmental work—in training, research, policy, institution building, or other activities—would be a way to gain further AID interest and support. For Title XII universities to cultivate these opportunities will require outreach from the colleges of agriculture (that tend to control technical assistance programs) with other parts of the university with relevant expertise, particularly environment and natural resources management. Significant potential in these areas also lies outside the Title XII universities, and in fact much of the work that has been done has been undertaken by non-Title XII schools. A 1988 BIFAD document notes that:

> The diverse talents in the forestry schools, departments of fisheries and wildlife, in faculties of range, soil, ecology, and in the varied water programs areas have had limited involvement through Title XII programs to date. Yet they have important capabilities in both project development and human and institutional development that can improve the developing countries' capacity for forming and implementing economic and social polices that integrate environment, natural resources, and sustainable agriculture issues [78].

Substantial opportunities as well as challenges for university collaboration lie in fields that are relatively new to the development assistance agenda, but that have rapidly gained importance. Sustainable agriculture, policy research and analysis, and environmental issues in recent years have emerged as priorities in development assistance programs. Through joint efforts, universities may develop a comparative advantage at:

- conducting research on environmental issues and developing designs and strategies for related projects,
- building or enhancing indigenous capacity to provide sustainable agricultural technology, and
- developing links between experts in specific fields at different institutions to provide much-needed information and analytical capacities in policy reform.

However, neither AID nor universities have taken advantage of the range of resources available for such collaborative ventures. Data banks and personnel rosters of all staff who have the interest and expertise required for project activity could be developed and made available.

Collaborative efforts among consortia members, or other linkages, should make course offerings in such areas as sustainable agriculture, low-resource agriculture, and agroforestry accessible to a larger number of students across the various universities. Furthermore, universities can collaborate to offer a unique service in development assistance by directing training for a specific country or region. The University of Wisconsin and Purdue University effectively carried out such a program for 300 Brazilian students, administering programs spread over more than 30 institutions.

AID recently has established the Sustainable Agricultural Systems Collaborative Research Support Program (CRSP) in response to congressional mandates. AID has requested the National Academy of Sciences to assist in development of this CRSP:

> The NAS will appoint a panel of experts from U.S. and international institutions; identify researchable constraints to sustainable agriculture; identify required component disciplines; develop mechanisms for integration of components; and design a global implementation plan for a sustainable agriculture CRSP [100].

Supporting universities have not been identified, but clearly could play a prominent role.

Finally, the IARCs have identified sustainable agriculture as an important goal of their international agricultural research programs. In general, the IARCs have incorporated research related to agricultural sustainability into ongoing work "as the issue has gained salience and its omission in the past has been seen to have incurred costs or added risks" [18]. In fact, the underlying mission of the CGIAR system has been modified by experience with nonsustainability of some systems developed:

> While the system was born with the mission of increasing total food production potential in developing countries, it is ever clearer that this objective is tempered by sustainability considerations, by the need to lower external inputs, and by the need to support poor people who live in less-favored areas that will never contribute substantially to aggregate food production [18].

Most IARCs have some work underway related to the physical, biological, and socioeconomic determinants of sustainable systems. Despite recognition of the high priority of agricultural sustainability concerns, however, many IARCs are "reluctant to reallocate existing resources so rapidly as to endanger the successful completion of ongoing research" [18]. Increased support, both financial and human, probably is required for a major increase in IARC attention to sustainable agriculture. AID, USDA, and U.S. universities could assist these efforts.

Second Generation Development Assistance

The other two new development opportunities—building links with advanced developing countries and addressing second generation problems of developing country institutions—do not receive substantial funding but they may offer significant potential for university involvement. One AID official has characterized aspects of these emerging opportunities:

> A new wave of projects appears to be emerging of a "second generation" character where AID is returning to developing country universities which it formerly assisted and establishing a new round of project assistance. This second generation of assistance will likely be of a different order with the focus less on institutional pairing than on assisting the revitalization of the host-country university through collaboration with faculty and networks from a wide range of universities in both the developed and developing countries [32].

A current criticism of U.S. assistance is that once the United States is successful in helping a country develop, AID's ties with the country are cut and the United States is less able to benefit from this success. Increased attention is being paid to the concept of "mutual benefits" of assistance, in which both the recipient and the United States gain. An example of mutual benefits in agriculture would be using assistance to link U.S. public and private agricultural research agencies with countries that have developed strong national agricultural research systems to conduct research of benefit to both countries.

There is one concern about how development oriented this work would be, since the focus would probably be on more advanced research topics. Questions arise about AID's involvement given its present mandate. Another U.S. agency, such as USDA or the National Science Foundation might be more appropriate.

A further difficulty may arise from a strong U.S. domestic constituency arguing that development assistance should not lead to developing country competition with U.S. exports (see box 3-A in ch. 3). A focus on the less developed countries has partly avoided this problem since many of these countries do not pose serious competition to U.S. producers, at least in the short-term. The advanced developing countries on the other hand could pose more serious competition, and programs to collaborate with them may engender greater domestic political opposition.

Agricultural institutions that have received U.S. foreign aid now may be facing criticisms on the relevancy/effectiveness of their work and even wondering about their continued existence. U.S. universities could play a role in addressing some of these problems by:

- educating the next generation of faculty;
- providing access to advances in science and education;
- helping build new programs (e.g., in the social sciences, agribusiness, natural resources and environment, and forestry);
- helping the school play an increased role in research or policy advice;
- finding alternate funders; and
- linking to constituency groups.

At the same time, schools in developing countries may need to reduce their emphasis on increased agricultural production, avoid overspecialization and the fragmentation of disciplines, and focus instead on being an agent of rural development. This means emphasizing employment, income generation, environment and natural resource management, and rural policy and institutional issues [30,31].

Appendix A

Title XII: Famine Prevention and Freedom From Hunger[1]

Sec. 296. General Provisions—(a) The Congress declares that, in order to prevent famine and establish freedom from hunger, the United States should strengthen the capacities of the United States land-grant and other eligible universities in program-related agricultural institutional development and research, . . . , should improve their participation in the United States Government's international efforts to apply more effective agricultural sciences to the goal of increasing world food production, and in general should provide increased and longer term support to the application of science to solving food and nutrition problems of the developing countries.

The Congress so declares because it finds—

(1) that the establishment, endowment, and continuing support of land-grant universities in the United States by Federal, State, and county governments has led to agricultural progress in this country;

(2) that land-grant and other universities in the United States have demonstrated over many years their ability to cooperate with foreign agricultural institutions in expanding indigenous food production for both domestic and international markets;

(3) that, in a world of growing population with rising expectations, increased food production and improved distribution, storage, and marketing in the developing countries is necessary not only to prevent hunger but to build the economic base for growth, and moreover, that the greatest potential for increasing world food supplies is in the developing countries where the gap between food need and food supply is the greatest and current yields are lowest;

(4) that increasing and making more secure the supply of food is of greatest benefit to the poorest majority in the developing world;

(5) that research, teaching, and extension activities, and appropriate institutional development therefore are prime factors in increasing agricultural production abroad (as well as in the United States) and in improving food distribution, storage, and marketing;

(6) moreover, that agricultural research abroad has in the past and will continue in the future to provide benefits for agriculture in the United States and that increasing the availability of food of higher nutritional quality is of benefit to all; and

(7) that universities need a dependable source of Federal funding, as well as other financing, in order to expand, or in some cases to continue, their efforts to assist in increasing agricultural production in developing countries.

(b) Accordingly, the Congress declares that, in order to prevent famine and establish freedom from hunger, various components must be brought together in order to increase world food production, including—

(1) strengthening the capabilities of universities to assist in increasing agricultural production in developing countries;

(2) institution-building programs for development of national and regional agricultural research and extension capacities in developing countries which need assistance;

(3) international agricultural research centers;

(4) contract research; and

(5) research program grants.

(c) The United States should—

(1) effectively involve the United States land-grant and other eligible universities more extensively in each component;

(2) provide mechanisms for the universities to participate and advise in the planning, development, implementation, and administration of each component; and

(3) assist such universities in cooperative joint efforts with—

(A) agricultural institutions in developing nations, and

(B) regional and international agricultural research centers, directed to strengthening their joint and respective capabilities and to engage them more effectively in research, teaching, and extension activities for solving problems in food production, distribution, storage, marketing, and consumption in agriculturally underdeveloped nations.

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[1] Title XII was established in the International Development and Food Assistance Act of 1975 (22 U.S.C. 2220a. sec. 312 of Public Law 94-161 (89 Stat. 849)), and was substantially amended by the International Development and Food Assistance Act of 1978 (Public Law 95-424; 92 Stat. 945), International Development Cooperation Act of 1979 (Public Law 96-53, 93 Stat. 364), and section 6 of Reorganization Plan No. 2 of 1979, which established the IDCA and transferred all responsibilities for the implementation of this title from the Administrator of the Agency for International Development to the Director of IDCA.

(d) As used in this title, the term "universities" means those colleges or universities in each State, territory, or possession of the United States, or the District of Columbia, . . . which are commonly known as "land-grant" universities; . . . sea-grant colleges; and other United States colleges and universities which—

(1) have demonstrable capacity in teaching, research, and extension activities in the agricultural sciences; and

(2) can contribute effectively to the attainment of the objective of this title.

(e) As used in this title, the term "Administrator" means the Administrator of the Agency for International Development.

Sec. 297. General Authority—(a) To carry out the purposes of this title, the President is authorized to provide assistance on such terms and conditions as he shall determine—

(1) to strengthen the capabilities of universities in teaching, research, and extension work to enable them to implement current programs authorized by paragraphs (2) (3) (4), and (5) of this subsection, . . . ;

(2) to build and strengthen the institutional capacity and human resources skills of agriculturally developing countries so that these countries may participate more fully in the international agriculture problem-solving effort and to introduce and adapt new solutions to local circumstances;

(3) to provide program support for long-term collaborative university research, in the developing countries themselves to the maximum extent practicable, on food production, distribution, storage, marketing and consumption;

(4) to involve universities more fully in the international network of agricultural science, including the international research centers, the activities of international organizations such as the United Nations Development Program and the Food and Agriculture Organization, and the institutions of agriculturally developing nations; and

(5) to provide program support for international agricultural research centers, to provide support for research projects identified for specific problem-solving needs, and to develop and strengthen national research systems in the developing countries.

(b) Programs under this title shall be carried out so as to—

(1) utilize and strengthen the capabilities of universities in—

(A) developing capacity in the cooperating nation for classroom teaching in agriculture, plant and animal sciences, human nutrition, and vocational and domestic arts and other relevant fields appropriate to local needs;

(B) agricultural research to be conducted in the cooperating nations, at international agricultural research centers, or in the United States;

(C) the planning, initiation, and development of extension services through which information concerning agriculture and related subjects will be made available directly to farmers and farm families in the agriculturally developing nations by means of education and demonstration; or

(D) the exchange of educators, scientists, and students for the purpose of assisting in successful development in the cooperative nations;

(2) take into account the value to the United States agriculture of such programs, integrating to the extent practicable the programs and financing authorized under this title with those supported by other Federal or States resources so as to maximize the contribution to the development of agriculture in the United States and in agriculturally developing nations; and

(3) whenever practicable, build on the existing programs and institutions including those of the universities and the United States Department of Agriculture and the United States Department of Commerce.

(c) To the maximum extent practicable, activities under this section shall—

(1) be directly related to the food and agricultural needs of developing countries;

(2) be carried out within the developing countries;

(3) be adapted to local circumstances;

(4) provide for the most effective interrelationship between research, education, and extension in promoting agricultural development in developing countries; and

(5) emphasize the improvement of local systems for delivering the best available knowledge to the small farmers of such countries.

(d) The President shall exercise his authority under this section through the Administrator.

Sec. 298. Board for International Food and Agricultural Development—(a) To assist in the administration of the programs authorized by this title, the President shall establish a permanent Board for International Food and Agricultural Development (hereafter in this title referred to as the "Board") consisting of seven members, not less than four to be selected from the universities. Terms of members shall be set by the President at the time of appointment. Members of the Board shall be entitled to such reimbursement for expenses incurred in the performance of their duties (including per diem in lieu of subsistence while away from their homes or regular place of business) as the President deems appropriate.

(b) The Board's general areas of responsibility shall include, but not be limited to—

(1) participating in the planning, development, and implementation of,

(2) initiating recommendations for, and

(3) monitoring of, the activities described in section 297 of this title.

(c) The Board's duties shall include, but not necessarily be limited to—

(1) participating in the formulation of basic policy, procedures, and criteria for project proposal review, selection, and monitoring;

(2) developing and keeping current a roster of universities—

(A) interested in exploring their potential for collaborative relationships with agricultural institutions, and with scientists working on significant programs designed to increase food production in developing countries,

(B) having capacity in the agricultural sciences,

(C) able to maintain an appropriate balance of teaching, research, and extension functions,

(D) having capacity, experience, and commitment with respect to international agricultural efforts, and

(E) able to contribute to solving the problems addressed by this title;

(3) recommending which developing nations could benefit from programs carried out under this title, and identifying those nations which have an interest in establishing or developing agricultural institutions which engage in teaching, research, or extension activities;

(4) reviewing and evaluating memorandums of understanding or other documents that detail the terms and conditions between the Administrator and universities participating in programs under this title;

(5) reviewing and evaluating agreements and activities authorized by this title and undertaken by universities to assure compliance with the purposes of this title;

(6) recommending to the Administrator the apportionment of funds under section 297 of this title; and

(7) assessing the impact of programs carried out under this title in solving agricultural problems in the developing nations.

(d) The President may authorize the Board to create such subordinate units as may be necessary for the performance of its duties, including but not limited to the following:

(1) a Joint Research Committee to participate in the administration and development of the collaborative activities described in section 297(a)(3) of this title; and

(2) a Joint Committee on Country Programs which shall assist in the implementation of the bilateral activities described in sections 297(a)(2), 297(a)(4), and 297(a)(5).

(e) In addition to any other functions assigned to and agreed to by the Board, the Board shall be consulted in the preparation of the annual report required by section 300 of this title and on other agricultural development activities related to programs under this title.

Sec. 299. Authorization—(a) The President is authorized to use any of the funds hereafter made available under section 103 of this Act to carry out the purposes of this title. Funds made available for such purposes may be used without regard to the provisions of sections 110(b) and 122(d) of this Act.

(b) Foreign currencies owned by the United States and determined by the Secretary of the Treasury to be excess to the needs of the United States shall be used to the maximum extent possible in lieu of dollars in carrying out the provisions of this title.

(c) Assistance authorized under this title shall be in addition to any allotments or grants that may be made under other authorizations.

(d) Universities may accept and expend funds from other sources, public and private, in order to carry out the purposes of this title. All such funds, both prospective and inhand, shall be periodically disclosed to the Administrator as he shall by regulation require, but no less often than in an annual report.

Sec. 300. Annual Report—The President shall transmit to the Congress, not later than April 1 of each year, a report detailing the activities carried out pursuant to this title during the preceding fiscal year and containing a projection of programs and activities to be conducted during the subsequent five fiscal years. Each report shall contain a summary of the activities of the Board established pursuant to section 298 of this title and may include the separate views of the Board with respect to any aspect of the programs conducted or proposed to be conducted under this title.

Appendix B

Programs Supporting Research and Technology Generation

U.S universities have participated in research related to development assistance in several ways. The Collaborative Research Support Program (CRSP) and the International Agricultural Research Centers (IARCs) provide forums for scientists, researchers, and graduate students from U.S. institutions to work in conjunction with other experts on global issues affecting development. AID also has generated a special collaborative program with Historically Black Colleges and Universities. U.S. university faculty also work on AID Mission project research, which usually entails supporting a national agricultural research organization in the host country.

Collaborative Research Support Program (CRSP) and Other Research and Technical Services Projects

AID's Bureau for Science and Technology manages the majority of the AID-supported research activities conducted by universities. AID and universities carry out the majority of their agricultural research through grant-funded CRSPs or other research and technical services projects funded through cooperative agreements or grants. The CRSPs use matching grants as a mechanism and most other research and technical services projects use cooperative agreements.

CRSPs were formed for the conduct of long-term, collaborative research in areas of mutual interest to U.S. and LDC institutions and were designed to create strong linkages between the two along with mutual benefits. Each CRSP uses a multidisciplinary approach to analyze and solve specific problems in the fields of food, nutrition, or rural development [57]. The nine CRSPs focus on the following topics: small ruminants, sorghum and millet, beans and cowpeas, soil management, nutrition, peanuts, pond dynamics, fisheries, and sustainable agriculture (see table B-1).

U.S. and LDC institutions and the host country AID Mission participate in planning and continued development of the CRSP. Based on recommendations from BIFAD, AID selects one institution as the core planning entity for the CRSP. Later, AID and BIFAD select the institutions to be involved and designate one as the management entity. The planning entity develops a 5-year plan of action; the managing entity receives the grant and is in charge of running the CRSP. Through a series of subgrants allocated by the management institution, other institutions also participate in the CRSP. Three separate committees are important in the governance of CRSPs—a board of directors to direct CRSP policy, a technical committee to provide scientific guidance to the CRSP, and an external evaluation committee to provide evaluation and recommendations to the management entity and AID [81].

CRSPs focus on more than research: institution building and training are two other major CRSP activities. CRSPs sponsor educational programs to provide agricultural graduate and technical training to LDC students, scientists, and researchers and thereby build research capabilities in the LDCs.

Approximately 900 scientists from LDC institutions and 30 U.S. universities presently participate in the CRSPs. About 30 nations work with the United States through CRSPs [77]. Because of the mutuality of interest in CRSP subject matter, U.S. universities are required to match at least 25 percent of AID funding for CRSPs. Host countries are also required to contribute financial support for the program. Of the $152.3 million spent on CRSPs as of fiscal year 1985, the U.S. Government contributed $104.2 million, U.S. universities contributed $31.2 million, and host countries contributed $16.9 million. U.S. universities' contributions totaled about 30 percent of government expenditures, exceeding the 25 percent in matching funds required [77].

An outside review of the four oldest CRSPs in 1986 provided a positive overall assessment of the CRSPs. Achievements listed by reviewers included: excellent research results, focus on high priority issues, successful collaboration among U.S. universities and between U.S. and LDC institutions, and overall cost-effectiveness (having about 20 percent of the overhead costs that IARCs require). The evaluators found that CRSPs needed to improve their linkages with other CRSPs and LDC Missions [34].

Funding for CRSPs has dropped significantly in recent years. Prior to 1986, CRSP annual funding averaged about $20 million. After implementation of the Gramm-Rudman-Hollings balanced budget law in 1987, the CRSP budget dropped to $15.75 million [77]. BIFAD commissioned a study in 1987, to examine the effect of budget cuts on the viability of the CRSPs. The report deemed all of the CRSPs "viable" at that time, but warned that additional cuts would render some CRSPs dysfunctional [28]. The evaluators showed particular Concern that recent budget cuts have eroded the training and social science components of CRSPs, and that future cutbacks might prove fatal for these programs.

A central area of debate in the development community revolves around the possibility of enlarging the scope of CRSP work in the areas of extension and institution building. One criticism of the CRSPs has been that they

Table B-1—Universities Participating in AID's Collaborative Research Support Programs

Small Ruminant CRSP

Purpose: To improve production of meat, milk, and fiber from sheep, goats, and alpacas owned by smallholders in LDCs. Program began in 1978.

U.S. institutions: University of California at Davis,* University of Missouri, Utah State University, Texas Tech University, Texas A&M University, Colorado State University, Montana State University, Washington State University, North Carolina State University, and Winrock International.

Developing countries and regions: Worldwide (inc. projects in Indonesia, Kenya, Morocco, Peru, and Bolivia)

Program components and activities: Research—75 percent, Training—24 percent, Technical Assistance—0 percent, Other—1 percent

Funding: (in $ millions 1978-90); AID contributions: $38.314; University match: $14.395; Host country contributions: $21.42; Total: $74.129

Sorghum and Millet CRSP

Purpose: To improve the overall quality of life, both economically and nutritionally, in LDCs where sorghum and millet are principal food crops, through increasing sustainable production of these crops. Program began in 1979.

U.S. institutions: University of Nebraska at Lincoln,* Kansas State University, Mississippi State University, Purdue University, and Texas A&M University.

Developing countries and regions: Worldwide (including projects in Mali, Niger, Botswana, Honduras, Colombia, and Sudan)

Program components/activities: Research—70 percent, Training—20 percent, Technical Assistance—10 percent, Other—0 percent

Funding: (in $ millions 1981-90); AID contribution: $30.182; University match: $7.426; Host country contribution: $4.51; Total: $42.118

Bean/Cowpea CRSP

Purpose: To help organize and mobilize the financial and human resources available to: mount a multi-institutional US/LDC collaborative effort of research and training related to beans and cowpeas; improve the living conditions of small farm producers in developing countries; and increase the availability of low-cost, nutritious food for the rural and urban poor. Program began in 1980.

U.S. institutions: Michigan State University,* Purdue University, University of Georgia, Cornell University, University of Wisconsin, Boyce Thompson Institute, University of California at Davis, University of California at Riverside, University of Minnesota, University of Nebraska at Lincoln, University of Puerto Rico, and Washington State University.

Developing countries and regions: Africa and Latin America/Caribbean

Program components/activities: Research—60 percent, Training—35 percent, Technical Assistance—5 percent, Other—0 percent

Funding: (in $ millions 1981-90); AID contribution: $28.769; University match: $6.325; Host country contribution: $4.180; Total: $39.274

Soil Management CRSP

Purpose: To develop soil management technologies that are agronomically, economically, and environmentally sustainable in developing countries in the tropics. Program began in 1981 (planning grants during 1979-81).

U.S. institutions: North Carolina State University,* Cornell University, Texas A&M University, and University of Hawaii.

Developing countries and regions: Tropics Worldwide (includes projects in Indonesia, Mali, Niger, and Peru)

Program components and activities: Research—100 percent

Funding: (in $ millions 1982-90); AID contribution: $21.552; University match: $5.148; Host country contribution: $3.087; Total: $29.787

Peanut CRSP

Purpose: To improve the availability and consumption of food, increase incomes, and maintain and enhance the natural resource base through the development of a peanut research base in both the U.S. and host countries that can bring relief to constraints to peanut production and utilization. Program began in 1982.

U.S. institutions: University of Georgia,* Texas A&M University, North Carolina State University, and Alabama A&M University.

Developing countries and regions: Worldwide (inc. projects in semiarid tropical Africa, Southeast Asia, and Caribbean regions)

Program components and activities: Research—60 percent, Training—35 percent, Technical Assistance—5 percent

Funding: (in $ millions 1982-90); AID contribution: $12.558; University match: $2.940; Host country contribution: $1.227; Total: $16.725

Pond Dynamics/Aquaculture CRSP

Purpose: To define the principles underlying sound aquaculture management so as to provide increased employment and a dependable, inexpensive source of animal protein. Program began in 1982.

U.S. institutions: Oregon State University,* Auburn University, University of Hawaii, University of Michigan, Michigan State University, University of Arkansas at Pine Bluff, and the Consortium for International Fisheries and Aquaculture Development.

Developing countries and regions: Honduras, Rwanda, and Thailand.

Program components and activities: Research—100 percent

Funding: (in $ millions 1982-90); AID contribution: $7.449; University match: $1.668; Host country contribution: $2.218; Total: $11.335

Fisheries Stock Assessment CRSP

Purpose: To improve analytical and sampling methodology for assessment and management of the size and sustainable yields of small-scale multispecies tropical marine capture fishery populations. Program began in 1986 (planning grant in 1982).

U.S. institutions: University of Maryland,* University of Delaware, University of Rhode Island, University of Miami, and University of Washington.

Developing countries and regions: Costa Rica and Philippines

Program components and activities: Research—100 percent

Funding: (in $ millions 1985-90); AID contribution: $3.919; University match: $1.005; Host country contribution: $0.066; Total: $5.190

Table B-1—Support Programs—Continued

Functional Implications of Marginal Malnutrition, Nutrition CRSP

Purpose: To provide new information on the effect of marginal food intake on human performance, and to contribute to food policy reform. Project began in 1981 (planning grant in 1978).

U.S. institutions: Purdue University (*1989-91), University of California at Berkeley (*1981-88), University of Connecticut, University of Arizona, University of California at Los Angeles, and University of Kansas Medical Center.

Developing countries and regions: Egypt, Kenya, Mexico

Program components and activities: Research—100 percent

Funding: (in $ millions 1981-90); AID contribution: $12.891; University match: $2.917; Host country contribution: NA; Total: $15.808

Sustainable Agricultural Systems CRSP—planning grant

Purpose: To identify constraints to development of sustainable agricultural systems and to prepare a research plan for a program that will bring about sustainable agriculture in developing countries. Planning began in 1990.

U.S. institutions: Not yet identified; planning currently conducted by the National Academy of Sciences.

Developing countries and regions: Worldwide

Program components and activities: Research—100 percent

Funding: (in $ millions); To be determined

*Indicates management entity.

SOURCE: Loren Schulze, U.S. Agency for International Development, Bureau for Science and Technology, Office of Agriculture, personal communication, Apr. 23, 1991; Board for International Food and Agricultural Development, "The Collaborative Research Support Program (CRSP)," Apr. 12, 1989; U.S. Agency for International Development, Office of Agriculture, "Program Guide to the Office of Agriculture," 1990; U.S. Agency for International Development, Office of Nutrition, "Program Directory," June 1990.

are research organizations that do not disseminate their information successfully. Evaluators stated in the 1986 review that CRSPs were prolific generators of papers and articles but funneling information through academic channels generally does not disseminate the information to those who most need it. However, the reviewers cautioned: "The CRSP cannot be all things to all people" [34]. In the face of declining budgets, the reviewers suggested that broadening CRSP activities too much in the field of institution building and extension would "only lead to a dimunition in the quality of CRSP research" [34].

While CRSPs generally cover a large but specific topic, other university research and technical services projects can be used for funding research on smaller topics and generally are supported through cooperative agreements. For example, Kansas State University's grain storage program does not require a CRSP-size program; a cooperative agreement program is more suitable. These smaller non-CRSP research programs are generally viewed as more efficient and responsive than CRSPs due to lower overhead and management costs and because they are generally entered into with a single university, making decision processes simpler. AID also has a relatively simple procedure for facilitating buy-ins of technical services from these programs by Missions. CRSP resources are more difficult to access. Research programs supported through cooperative agreements, however, may require more AID management time than CRSPs. An AID manager evaluating a CRSP with 10 projects need only write 1 evaluation. Evaluating 10 cooperative agreements requires 10 sets of paperwork [42].

International Agricultural Research Centers (IARCs)

As multidisciplinary centers for adaptive research, IARCs draw together scientists, policymakers, and other experts for research on problems related to LDC agriculture. The IARC system consists of 13 individual centers, each sharing the common goal of increasing LDC agricultural productivity as a means to increase farm incomes, lower food costs, and improve human health.

The IARCs received strong support from AID throughout the 1980s, reaching a peak of $46 million before leveling off at about $40 million at the end of the decade [59]. Previously, AID's Science and Technology Bureau (AID/S&T) funded the IARCs, but recently funding responsibilities were shifted to the Bureau for Program and Policy Coordination (AID/PPC), although AID/S&T retains management responsibilities.

The United States currently contributes about 18 percent of the IARCs' annual budget, the remainder coming from approximately 40 other international donors. International donors pledged $228 million for the IARCs for fiscal year 1989 [23]. Because IARCs are international in nature and receive the majority of their funding from non-U.S. Government sources, they are more autonomous and subject to less U.S. control than the CRSPs, the latter being overseen by the U.S. Government and funded almost entirely by U.S. sources.

Like the CRSPs, the IARCs focus only partly on research. They also try to help build the research capabilities of developing countries by offering training to LDC researchers, scientists, and graduate students. Graduate students and visiting scientists from various institutions around the world also come to contribute to and learn from the IARCs. The IARCs have trained at least 20,000 agricultural scientists from LDCs to date [23].

IARCs also create linkages with the National Agricultural Research Systems (NARS) in LDCs. Their goal is to complement LDC national research systems, not to substitute for them [15]. Training has traditionally been one way for IARCs and NARSs to form bonds, because many scientists trained at IARCs go on to work for national research centers [23].

Although some IARC-NARS linkages have met with success, problems may arise from attempts to connect the two entities. Collaboration between IARCs and NARS can result in diminished funding for the national systems as more money is allocated to the collaborative effort. Because participants in IARC programs tend to receive higher visibility and more professional opportunities than those in NARS, IARCs can draw commitment away from national programs. In the least developed countries, where the NARS may have the most problems surviving, IARCs sometimes are perceived as replacements for the national systems. These factors can undermine attempts to develop national research capabilities in LDCs. Some critics also claim that, although IARCs effectively pursue specific project objectives in collaboration with the NARS, they do not concentrate on strengthening the capabilities of the national systems in a sustainable manner [37].

The IARCs receive their direction from the Consultative Group for International Agricultural Research (CGIAR), a body created in 1971 made up of representatives from international organizations, governments, and foundations to fundraise for the IARCs and coordinate their activities. CGIAR also works to ensure that the IARCs are accountable for their funding. CGIAR created the Technical Advisory Committee composed of 12 members, half from LDCs and half from developing countries, to carry out systemwide reviews of Center programs [57].

IARCs were not formed on the basis of university participation. In the early years of the IARCs' existence the centers seemed to avoid a close relationship with universities from industrialized countries. This attitude seems to have changed, and IARC activities today involve U.S. universities in several ways. Most university participation is arranged on an ad hoc, scientist-to-scientist basis. A program for Collaborative Research on Special Constraints represents the only formal AID-supported linkage between U.S. universities and IARCs, providing grants to scientists at U.S. universities to research specific bottleneck issues restricting progress in IARC research.

Linkages between IARCs and CRSPs also promote U.S. university participation in the IARCs. The linking of IARCs with CRSPs increasingly is seen as a way of sharing research information as well as complementing the various strengths of each program. CRSPs fill an important gap between work covered by the IARCs and research carried out by U.S. scientists. However, a certain amount of overlap between the two may promote competition for researchers and funding. Concern exists that a fully noncompetitive, collaborative relationship between CRSPs and IARCs would be hard to achieve.

The CGIAR commissioned a major review of the IARC system in 1985, and the IARCs received an overall positive assessment. The evaluators emphasized the vitality of the IARCs in international research and the successes of their training and research, particularly in the areas of wheat and rice production. Among the areas of weakness, however, were:

- absence of research results for IARCs working on particularly confounding issues,
- failure to realize the full potential of working with LDC officials on policies affecting food production issues,
- failure to investigate the problems of female farmers in male-dominated societies and the limited presence of women in research organizations, and
- a tendency to underemphasize certain crops that might improve food production in the developing world [19].

The reviewers predicted that the IARCs will continue to play a crucial role in LDC-related research given the perceptions of the weakness of most national research systems.

A 1986 audit of IARCs by AID's Inspector General applauded the IARCs' contributions to wheat and rice production, but questioned the overall contributions of IARCs to LDCs.

> AID's investment in the Centers since 1967 now totals $350 million. This large investment should have resulted in measurable benefits to the small farmers—however, our audit as well as the Centers own [19] impact study found that this has not occurred [102].

The Inspector General's report listed several barriers to implementation of IARC technologies by small farmers:

- National agricultural research organizations were not capable of adapting IARC technologies to local conditions.
- The means to extend technology to the farmer often did not exist.
- Countries lacked adequate seed production capability, fertilizer, and storage facilities.
- Policies on crop prices and other inputs were unfavorable to the farmer.

Some of these conclusions are viewed by many as being overly critical. Other evaluations of the IARCs have tended to be more positive, although they acknowledge a deficiency on the part of the IARC's in disseminating research knowledge. A number of technical papers on the IARCs have praised the level of their contributions to international development. One internationally recognized scholar on research productivity wrote:

> A donor agency interested in getting the maximum increment of food supply in the developing world from a given aid grant will obtain it by investing more in an IARC. . . . Furthermore, investments in IARCs stimulate more national system investment than will a comparable amount of direct aid [22].

Research Grants Program for Historically Black Colleges and Universities (HBCUs)

AID created the Research Grants for HBCUs in 1984 as a mechanism for accessing the research skills of scientists in the HBCUs in international development. To date, 30 HBCUs have been awarded a total of 127 grants at a total cost of $11.4 million. The research has been conducted in 28 developing countries and the United States [10]. Of the 116 HBCUs belonging to the National Association for Equal Opportunity in Higher Education, 90 have signed Memoranda of Agreement with AID, thereby increasing the pool of talent available to do AID development work. To date, AID has allocated approximately $2 million per year for the HBCU grants program— 50 percent for agriculture and 50 percent for health proposals. An average grant is about $90,000; the upper limit for any one grant is $100,000. Approximately 20 new grants are awarded annually in agricultural and health related areas after review by special panels at the National Research Council [49].

A National Research Council panel conducting a 1989 evaluation of the HBCU Research Grants program found it too soon after the creation of the program to assess the impact of grants on the production of relevant research, but concluded that "there are a sufficient number of demonstrated successes in the program's brief history to indicate that the program is achieving its goal" [116]. Since that evaluation, approximately half of the 127 funded proposals have been completed. From these completed projects more than 100 scientific articles have been published in refereed journals; providing one measure of successful productivity [10].

Appendix C

AID Regional Bureau Strategies

Bureau for Latin America and the Caribbean (AID/LAC)

Agricultural and rural development is the major thrust—about 40 percent—of AID's Development Assistance to Latin America and the Caribbean [70]. The Agency's agricultural development strategy for the region focuses on increasing and diversifying exports as a means to increase rural income [94]. Primary attention has been given to developing nontraditional agricultural exports for the U.S. market, although work also has addressed increasing productivity and marketing of traditional exports, such as bananas and coffee.

A premise of the strategy is that in the long term it will be more efficient for the region to concentrate on export crops and to increase import of cereal grains from the United States, where production costs are lower [94]. Export diversification has been promoted through:

- creation of private producer organizations to provide services;
- increased access to credit (a major expenditure);
- transfer of technology from other regions;
- establishment of private foundations to support research;
- support for increased access to land;
- development of rural infrastructure—roads, onfarm storage, and irrigation systems; and
- support for privately owned processing and packing plants.

Economic Support Funds (ESF) and P.L. 480 food aid have been used to encourage supportive policies such as market-driven exchange rates, reduced price controls on agricultural commodities, reduced State involvement in agricultural input and commodity marketing, and simplified export procedures and export incentives [94].

One effect of AID's agricultural export-focused strategy has been reduced work with public organizations, such as the national research systems. The emphasis on the private sector, such as that promoted through the Caribbean Basin Initiative, has been partly responsible for this but so has frustration with public organizations and their associated inefficiencies, lack of financial support, and political influences. AID was involved earlier in the successful development of public organizations in the region's larger countries, such as Brazil. The smaller nations suffer from lack of financial and human resources, populations too small to support such organizations, and in some cases from political instability.

Within AID some disagreement exists over the dearth of work with public organizations. In part the disagreement stems from the argument that increased production of basic food crops is necessary to increase the region's food security. Since food crop research is conducted by the national agricultural research systems, the argument concludes that AID should therefore work to strengthen these national systems, help ensure that they have access to resources and trained personnel, and link them to the appropriate domestic and international bodies [95].

AID/LAC recognizes that its export-led strategy cannot be maintained without capable host country organizations, some of them public. AID has provided support to several public education organizations that are to serve as regional agricultural education, training, and research centers for groups of small countries. These include the Pan American Agricultural School in Honduras, the Humid Tropics Regional Agricultural School and the Agricultural Technology Research and Training Center in Costa Rica, the College of Agriculture in Jamaica, and the National Agrarian University in Peru.

Sustainable development of nontraditional export crops requires technologies that will not degrade the environment nor contaminate the product (e.g., through improper use of pesticides). It is not yet apparent whether private research foundations will develop such technologies. Also, the indigenous national capacity for policy analysis necessary to maintain policy reform has not yet been developed [94].

AID released a natural resource strategy for Central America in June 1989 that outlines five areas for support:

1. sustainable agriculture;
2. production from natural forests;
3. management of wildlands and protection of biological diversity;
4. management of critical watersheds; and
5. policy formulation, institutional strengthening, and environmental education.

The Plan projects obligations to reach $50 to $100 million annually by 2000, depending on the success of economic stabilization programs in the region. The strategy envisions assisting host governments, regional educational institutions, and private local and international groups. Nongovernmental organizations (NGOs) are seen as taking on much of the field implementation while public agency activities may be scaled back, in part due to budget limitations [93].

Bureau for Asia and the Near East (AID/ANE)

Agricultural and rural development assistance is an important component of AID's work in the Asia and Near East region, and has made up between 15 and 25 percent of AID's economic assistance to the region in the 1980s [61]. AID's strategy for the region has stressed policy dialogue, increased private sector roles, improved environment for science and technology, natural resource management, and attention to "advanced developing countries" [69]. A recent summary of the AID agriculture and rural development strategies for 10 countries shows assistance for policy dialogue in 9 countries; for private sector work in 6 countries; and for agricultural research, education, and extension in 8 countries [61].

The AID/ANE Bureau's agricultural strategy currently is undergoing substantial revision, in part because of the changing economic status of the region. A new draft strategy sets out a common path of agricultural development in the region, based on review of experiences over the past two decades [92].

The first step calls for the introduction of high-yielding cereal varieties along with infrastructure development (roads and irrigation) and supportive government pricing policies for inputs and outputs plus import restrictions. The resulting increase in grain production is expected to foster social stability plus increased employment and per capita incomes, which will lead to greater demand for manufactured goods and services. Labor—supported by cheap food and in time pushed by slowing labor demand in agriculture due to slowing yield increases—should move into the manufacturing and service sectors. Increased urban incomes will lead to demand for processed and higher protein foods, such as meat and dairy products. At this point, growth in agricultural employment is expected in processing, marketing, and transport for domestic and export markets.

Using this model, AID has divided the countries of Asia and the Near East into three types of economies: low-income agricultural, low-income transitional, and middle-income industrializing (see table C-1). U.S. development assistance is to be provided in accordance with the economic stage of a country in order to help the country advance along the lines of the model.

Low-income agricultural economies are those in which per-capita income is below $250 a year, and agriculture produces more than 50 percent of income and industry less than 20 percent. In these nations, cereal production has not kept pace with population growth, per-capita caloric consumption is below recommended levels, and the intensity of agricultural production is low. The major development objective is to increase basic cereals production. AID can support this through investments in development and diffusion of technology; improvement in support systems needed for intensification of production (e.g., input markets, irrigation, and transport); strengthening government's capability for making supportive interventions and understanding of the environmental costs of the production focus; and training of personnel.

Table C-1—Development Assistance Recipients in Asia and the Near East Region by Stage of Economy

Low-income agricultural	Low-income transitional	Middle-income industrializing
Bangladesh	Egypt	Jordan
Burma	India	Oman
Nepal	Indonesia	Thailand
	Morocco	Tunisia
	Pakistan	
	Philippines	
	Sri Lanka	
	Yemen	

SOURCE: U.S. Agency for International Development, Bureau for Asia and Near East, Office of Technical Resources, Agriculture and Natural Resources Division, "A Rural Economic Growth Strategy for Asian and Near East Countries in the 1990s," draft, January 1989.

Low-income transitional economies are those in which per-capita income ranges between $251 and $750 a year, and agriculture produces less than 35 percent of income and industry more than 25 percent. In these nations, cereal production exceeds population growth; per-capita caloric intake approaches recommended levels; increased per-capita income leads to demands for processed and higher protein foods; and development of the industrial sector grows. The major development objectives are the maintenance of growth in cereal production and the expansion of the industrial sector, especially in agro-processing. AID could support these objectives by fostering government changes in policy, such as reductions in expensive production supports no longer needed; withdrawal from agricultural markets in favor of the private sector; and liberalized trade policy. AID also could support increased efficiency of the agricultural research system, encourage private sector investment in agro-processing, support improved watershed management, and develop the human resources and institutions to maintain these activities. One hoped-for impact of increased employment in agro-processing would be the reduction of population in, and intensive farming of, marginally endowed areas, thereby reducing their environmental degradation.

Middle-income industrializing economies are those in which per-capita income is above $751 a year, and agriculture provides less than 20 percent of income and industry more than 30 percent. In these nations, growth occurs in both noncereal agriculture and agriculture-related industry; per-capita caloric intake is above recommended levels (through production and/or imports); and the government has withdrawn from control of agricultural markets and liberalized trade. The major development objectives and role for AID are strengthening of the domestic agricultural institutions (e.g., trade, agribusiness, research) and linking them to one another and with their international counterparts through such means as collaborative research, scholarly exchanges, and increased trade links.

The strategy includes some work that universities have been involved in in the past, such as increasing agricultural production, working with research systems, and training. It does not include major agricultural institution-building, except possibly in the low-income agricultural economies, and includes large emphasis on trade, investment, agribusiness, and policymaking—areas in which universities have not traditionally been involved in development assistance.

The AID/ANE Bureau is in the process of developing a strategy for environment and natural resources as well. Its development is in a much earlier stage than the new agricultural strategy.[1] The strategy is expected to address five areas:

1. agricultural sustainability,
2. quality and quantity of water and trade-offs in its use,
3. reducing environmental impacts of energy use while increasing its efficiency and meeting increased demand,
4. improving the urban environment (primarily sanitation), and
5. management and protection of biological resources.

Much of the work is to be geared to NGOs and PVOs with some potential roles for universities, especially in training and institution building—although widespread attention to enhancement of environmental and natural resource capability at Asian host-country universities and research institutions is likely to exceed current budget allocations.

A number of new environmental and natural resource projects are slated to begin in 1990. These are larger and broader than past projects and address environmental policy, institutional development, and training in addition to field-oriented activities (e.g., tree plantations and onfarm forestry).

Bureau for Africa (AID/BA)

Unlike the other two regional bureaus, the Bureau for Africa has no separate strategy for agricultural development. Instead, agriculture is discussed as part of the Bureau's overall development strategy for the region and also in plans addressing specific agricultural issues, such as agricultural research. The Bureau's regional development strategy closely reflects AID's overall development strategy and proposes accelerated national economic growth through:

- economic stabilization and policy reform,
- emphasis on the private sector,
- emphasis on institution building and human resources development, and
- emphasis on the agricultural sector [86].

Development in the agricultural sector is to be supported through policy reforms and private sector development in such areas as market liberalization, pricing policy, and privatization of parastatals; improved market links and transport; institution building and education/training—including a focus on agricultural research; and, as the strategy evolved, natural resource management [73].

Beginning in fiscal year 1987, separate development funding accounts were merged into one account for Africa, known as the Development Fund for Africa (DFA). The DFA gave the Bureau greater flexibility in programming, allowing it to steer nonproject assistance to support of policy reforms and to focus on those countries having a potential for growth and committed to improving economic policies. Current objectives of the DFA include:

- maintaining its focus on market-oriented economic growth:
- reducing the public sector role in the economy and increasing its efficiency through reduced involvement in the production and marketing of goods and services;
- improving economic stability through debt management and fiscal and monetary policy, and rationalizing expenditures on public goods (e.g., health, education, and family planning) while increasing their equity and efficiency;
- liberalizing markets for commodities, capital, and labor to support private sector-led growth;
- developing the potential for long-term productivity increases through conservation of natural resources, new technologies, and improved job skills; and
- improving food security through use of food aid, early warning systems, targeted welfare programs, and increases in agricultural production and utilization [85].

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[1] Concerns have been voiced that development of the two strategies has not been well coordinated and that they may conflict, for example, whether to provide assistance to marginally endowed regions that may be important in the protection of natural resources but which give less returns than investments in agriculturally better-endowed areas. In addition, concerns have been raised over a lack of developing country personnel involvement in strategy formation.

In addition to its overall plan for the DFA, the Africa Bureau has two other plans directly relevant to agricultural development: one supporting agricultural research and faculties of agriculture, and the other to manage natural resources.

In 1985, AID released the "Plan for Supporting Agricultural Research and Faculties of Agriculture in Africa." The plan outlines long-term, 15-year support to develop national agricultural research systems, regional research networks, and higher education programs in agriculture. Countries are categorized by their technical capacity (technology-producing or technology-adapting). Priorities for support are set by country, commodity, and other research area. Currently AID has four regional agricultural research projects and is working with research institutions in eight technology-producing countries and 13 technology-adapting ones. AID has faculty of agriculture projects with nine countries, five of which are ending in fiscal year 1989 [89].

Although AID funding of the plan has not reached the levels outlined in 1985, AID has supported agricultural research in most of the higher priority countries. Support has been maintained in those countries carrying out policy reforms, but the trend in obligations for the past few years is one of decline.

Obligations for agricultural research made up over 6 percent of the DFA in fiscal year 1988; they are projected to fall to about 4.4 percent in fiscal year 1990 [87]. Support for faculties of agriculture has been uneven, often significantly lower than projected. For example, actual obligations in fiscal year 1988 were $5.5 million (1 percent of the DFA) rather than the projected $20 million [89]. The plan also included sustained support for four to six U.S. universities that were to help implement the plan's priorities, but this support has not been provided.

AID adopted the "Plan for Supporting Natural Resources Management in Sub-Saharan Africa" in February 1987. Under this plan, AID is to integrate natural resource management activities into its agricultural activities and human resources work. Additionally, two groups of countries are also to receive direct support for natural resource management: eight priority countries for AID natural resources assistance, and nine countries that may receive limited direct support. AID missions in both groups are to carry out a natural resource management assessment and from it develop an action program. The plan's priority technical concerns are loss of vegetation, soil erosion/loss of soil fertility, and declines in biological diversity. Also, arid/semiarid and tropical highlands are priority agroecological subregions along with Madagascar [88].

Following the plan, AID/BA began the National Resources Management Support project (NRMS) whose primary purpose is to provide technical services to AID missions, host governments, and PVOs/NGOs in order to encourage increased activities in natural resource management rather than to fund projects or long-term personnel (although some biodiversity projects have been funded) [91]. Results so far include completed natural resource assessments in 8 countries, project design in five countries, and a survey of PVO/NGOs in preparation for the provision of support services to them [90]. The Africa Bureau estimated that natural resource management work will receive 8 to 9 percent of the Development Fund for Africa's annual obligations between 1988 and 1990 [87].

Appendix D

University Consortia: Purpose and Membership

Consortium for International Development (CID)

Purpose: 1) to facilitate the involvement of the member universities and their faculties in international development, especially in arid and sub-humid areas; and 2) to promote orderly scientific development, management, and use of the world's natural resources.

Member Institutions
California State Polytechnic University
Colorado State University
Montana State University
New Mexico State University
Oregon State University
Texas Tech University
University of Arizona
University of Idaho
University of Wyoming
Utah State University
Washington State University

Mid-America International Agricultural Consortium (MIAC)

Purpose: 1) to provide for a combination of university resources so as to strengthen and enlarge international agricultural outreach services, 2) to complement the areas of strength in each of the member universities and at the same time expand the opportunities for faculty to participate in worldwide agricultural development activities, 3) to strengthen and enrich the academic and technical staffs of member universities in international agriculture, and 4) to build upon the history of harmonious working relations among these universities and take advantage of the close geographic proximity, especially as this would relate to an effectual and rapid response capability.

Member Institutions
Iowa State University
Kansas State University
Oklahoma States University
University of Missouri
University of Nebraska

Midwest Universities Consortium for International Activities, Inc. (MUCIA)

Purpose: 1) to internationalize the curriculum, research, and teaching of member universities, 2) share the national obligation to improve the lot of developing nations and their people by means of a qualified technical assistance programs, and 3) influence the priorities and agenda of donor and assistance agencies.

Member Institutions
Indiana University
Michigan State University
Ohio State University
Purdue State University
University of Illinois
University of Iowa
University of Minnesota
University of Wisconsin

Northeast Council for International Development (NECID)

Purpose: 1) to gather and share information about international program and project opportunities relating to agriculture, natural resources, and rural development, 2) to cooperate in developing proposals for external funding where such cooperation has clear advantages over individual proposals and is consistent with the objectives of the activity, and 3) to develop and disseminate a statement about the areas of strength of universities and colleges in the northeast which may be applied to problems in developing countries.

Member Institutions
Cornell University
Rutgers University
University of Connecticut
University of Delaware
University of Maine
University of Massachusetts
University of New Hampshire
University of Puerto Rico
University of Rhode Island
University of Vermont
West Virginia University

The South-East Consortium for International Development (SECID)

Purpose: 1) to facilitate collaboration on international activities in education, research, and extension, and 2) to foster university involvement in projects which would not be feasible to staff from a single institution.

Member Institutions
Alabama A&M University
Alcorn State University
Auburn University
Clemson University
Delaware State College
Duke University
Florida A&M University
Fort Valley State College
Georgia Institute of Technology
Kentucky State University
Langston University
Louisiana State University
Lincoln University
Mississippi State University
North Carolina A&T University
North Carolina State University
Pennsylvania State University
Prairie View A&M University
Research Triangle Institute
South Carolina State College
Southern University
Tennessee State University
Tuskegee Institute
University of Arkansas
University of Florida
University of Georgia
University of Kentucky
University of Maryland
University of Maryland
  (Eastern Shore)
University of North Carolina
University of Tennessee
Virginia Polytechnic Institute
  and State University
Virginia State University

Organization for Tropical Studies, Inc. (OTS)

Purpose: 1) to promote the study of science in the tropics, 2) to conduct organized programs of graduate training and research on tropical problems, and 3) to serve as a national and international agency for coordinating and facilitating the work of individuals and groups in the tropics. Unlike other consortia, OTS is a nonprofit corporation, established in 1963 to provide leadership in education, research, and the wise use of natural resources in the tropics.

Member Institutions
Auburn University
City University of New York
Cornell University
Duke University
Harvard University
Indiana University
Instituto Tecnologico (Costa Rica)
Louisiana State University
Michigan State University
Pennsylvania State University (system)
Rutgers University
Stanford University
State University of New York/Stony Brook
Smithsonian Institute
Tulane University
Universidad Nacional (Costa Rica)
Universidad of Costa Rica
University of Arizona
University of California (system)
University of Chicago
University of Connecticut
University of Florida
University of Georgia
University of Hawaii
University of Iowa
University of Kansas
University of Maryland
University of Miami
University of Michigan
University of Minnesota
University of North Carolina
University of Puerto Rico
University of Utah
University of Washington
University of Wisconsin
Washington University

Appendix E

Aid To Developing Countries: The Technology/Ecology Fit

Staff Paper
Food and Renewable Resources Program
Office of Technology Assessment
Congress of the United States

June 1987

The views expressed in this OTA Staff Paper do not necessarily represent the views of the Technology Assessment Board, the Technology Assessment Advisory Council, or individual members thereof.

OTA PROJECT STAFF

Roger Herdman, *Assistant Director*, OTA
Health and Life Sciences Division

Walter E. Parham, Food and Renewable Resources *Program Manager*

Analytical Staff

Alison L. Hess, *Project Director*

Bruce Ross-Sheriff, *Contractor*
Patricia Durana, *Research Analyst*

Administrative Staff

N. Ellis Lewis, *Administrative Assistant*[1]
Sally Shafroth, *Administrative Assistant*[2]
Nellie Hammond, *Secretary*
Carolyn Swann, *Secretary*

---

[1] From May 11, 1987.
[2] Until May 1, 1987.

Foreword

The U.S. Congress influences development assistance most directly through the U.S. Agency for International Development (AID) and five multilateral development banks (MDBs): the World Bank,[1] the InterAmerican Development Bank, the Asian Development Bank, the African Development Bank, and the Caribbean Development Bank. Congress also influences development assistance through a number of Federal civilian and military agencies, bilateral programs (e.g., the Peace Corps and the Overseas Private Investment Corporation), and multilateral organizations (e.g., United Nations' agencies).

The Chairmen and Ranking Members of the House Committee on Science and Technology[2] and its Subcommittee on Natural Resources, Agriculture Research and Environment requested the congressional Office of Technology Assessment (OTA) to investigate how aid agencies might improve their capability to match technologies to local environmental conditions of recipient development countries. The request grew out of an earlier study conducted under the auspices of the Environmental and Energy Study Institute (EESI) and ten Members of Congress. The EESI study identified the mismatch of technologies with developing country environments as a common contributing cause of development assistance project failures. One of the EESI report's 13 explicit recommendations for congressional and aid agency action was to conduct a study addressing this aspect of development assistance failure.[3]

The House Science and Technology Committee staff, and staff of several other interested committees, suggested that this OTA paper might serve as a resource for oversight and reauthorization hearings of the Foreign Assistance Act, which provides the framework for U.S. development assistance. To enhance the report's utility, questions are included that committee Members and staff might use in hearings or informal conferences with development assistance personnel.

This paper focuses primarily on AID and to a lesser extent on the World Bank. AID and the World Bank have made the most observable efforts to integrate environmental and development concerns. Other multilateral and bilateral organizations tend to emulate their environmental policies and procedures to various degrees. Today, the World Bank is undergoing major reorganization in part to enhance its environmental capability. It is not clear at this time what the magnitude of these changes will be, although the President of the World Bank, Barber Conable, has stated his environmental goals for the Bank's reorganization. Once the reorganization is complete, the success of this effort in achieving the stated environmental goals could be examined through the congressional hearing process.

This paper is based on information derived from: 1) a series of interviews with personnel of development assistance organizations, certain Executive and congressional agencies, nongovernmental organizations involved in development assistance, and development consultants; 2) an OTA workshop, and 3) study of selected aid organization reports (many of which are not intended for specific citation). By agreement with persons interviewed and workshop participants, observations are not attributed to particular individuals.

OTA greatly appreciates the contributions of the workshop participants, interviewees, and reviewers. As with all studies, the content of the Staff Paper is the sole responsibility of OTA.

John H Gibbons

JOHN H. GIBBONS
Director

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[1] The International Bank for Reconstruction and Development, the International Development Agency, and the International Finance Corporation comprise the World Bank.

[2] The Committee was renamed the Committee on Science, Space and Technology at the beginning of the 100th Congress.

[3] OTA and the World Resources Institute initiated similar studies; this report presents only the results of OTA's study.

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Appendix E
Aid To Developing Countries: The Technology/Ecology Fit

CONCLUSIONS

Ecological compatibility of technologies with local site conditions is fundamental to success of development assistance: Development assistance organizations know that the specific sociocultural, political, economic and ecological conditions of a development site create the framework into which their efforts must be integrated. Each of these will affect the sustainability of the development project. Regardless of the cause of resource degradation or damage, developing countries generally cannot afford even a temporary decline in food or foreign exchange derived from their natural resources, and they lack sufficient economic resources to implement reclamation or restoration activities. Thus, selection of ecologically appropriate technologies becomes imperative.

Why unsustainable technologies may be chosen: Most developing countries are located in tropical latitudes where, at many sites, few if any sustainable technologies exist to satisfy development needs. So technologies that worked elsewhere under different conditions are chosen and some of these prove unsustainable. When technologies developed for temperate areas are transferred without appropriate modification to tropical areas, they tend to disrupt ecosystem functions beyond natural regenerative capabilities, thus reducing the land's current and future productivity. Sustainable technologies, in other cases, do exist and have been demonstrated, but are rejected in favor of approaches that are expected to achieve other, overriding goals. Finally, no single individual is likely to have adequate technical knowledge to assess thoroughly whether a proposed technology will be compatible with the political, cultural, economic, and ecological conditions of the development site. Experts responsible for informing decision makers sometimes are unable to recognize which technologies will be sustainable. Thus, technologies may be promoted based on "best guesses," which sometimes are wrong.

Need for continued congressional oversight: Selecting technologies expressly to fit ecological conditions is becoming an important component of development assistance strategy at the U.S. Agency for International Development (AID). Similarly, the multilateral development banks (MDBs) have strengthened their capabilities to foresee and mitigate adverse environmental impacts from the projects they sponsor. These changes largely are reactions to pressure from Congress and other concerned organizations. Several initiatives at AID, and the environmental goals recently articulated by the President of the World Bank, suggest that the importance of ecological sustainability is becoming an accepted value for development assistance professionals. However, bureaucratic inertia seems to work against substantial improvement in the agencies' abilities in this regard. Therefore, continued pressure from Congress is needed to assure progress towards a goal of ecologically sustainable development.

Congress has a direct and profound influence on AID. Indeed, changes in AID's authorizing legislation and appropriations have contributed to a proliferation of high priority goals so numerous that they are widely perceived as a serious constraint to the agency's effectiveness. Thus, Congress is faced with a dilemma. "Micromanaging" AID by increasing the specificity of development objectives in the Foreign Assistance Act and earmarking shrinking development assistance appropriations for specific purposes may inhibit the agency's ability to develop and carry out efficient development assistance programs. Without pressure, on the other hand, AID may be slow to progress in integrating an environmental perspective in agency activities.

An alternate solution may be modified use of congressional oversight. This could include enhancing the capabilities of committee staff by adding additional personnel experienced in development assistance and technology development, and fostering improved collegial and informal working relationships between committee staff and AID personnel. Congress or AID could undertake a study of how congressional pressures are perceived within AID, and what mechanisms could improve productive interaction.

Attitudes at the top: Improvements to assure that promoted technologies are ecologically appropriate seem unlikely to occur on the scale needed without high-level management personally committed to this goal. Thus, congressional confirmation hearings-in which a candidate's capabilities and views are assessed—are an important mechanism to influence AID activities. Confirmation hearings provide an important opportunity for Congress to raise issues and to discern the depth of a nominee's knowledge of and concern for matching development projects and technologies to local conditions in developing countries, and are an appropriate place to reinforce the guidance given in oversight hearings and legislation. Careful attention should be focused on the personal knowledge and attitudes of a proposed AID Administrator, and on his/her criteria for selection of Assistant Administrators. Agency recruitment policies and practices, that ultimately affect the agency's ability to perform its mandate effectively, largely are determined at the Assistant Administrator level.

Congress does not formally influence the choice of officials in multilateral development banks, but it does approve appointments of Treasury Department officials who represent U.S. interests to the banks. Members of Congress probably can have a significant impact on selection of the top bank officials through informal communication with the Administration.

Having enough of the right people: Environmental science is a technical field based on scientific principles, knowledge, and tools that cannot be used effectively by persons without appropriate training and experience. Neither AID nor the World Bank has a sufficient number of environmental officers to assure agency wide guidance. Just as a development agency needs the right set of economists to design a commodity pricing intervention, it needs the right set of specialists to design and execute a successful intervention in the use of natural resources. Further, periodic accounting of natural resource conditions and environmental quality indicators to accompany reports of recipient country economic indicators prepared by development assistance organizations could provide a way to motivate these people to address carefully the match of technologies with ecological conditions.

Organizing technical skills: In addition to having an adequate number of people with needed technical expertise and fostering their collaborative work, it is necessary to ensure that these staff occupy appropriate positions in the organization so that they can provide needed expertise at the right times in the project cycle. Although environmental and natural resource expertise is integral to all stages of project development and implementation, particularly important stages are:

- problem/opportunity identification,
- contractor identification and selection for project design, and
- project monitoring and evaluation.

Thus, interdisciplinary teams might be established in AID to link the U.S. science and technology community with field activities, and to serve as a technical filter assuring that AID would be unlikely to select and transfer unsustainable technologies to developing countries. Each team would be charged to assist with evaluation, redesigning, or designing agency activities in one of several ecological zones common to developing countries (e.g., hot wet lands, arid/semiarid lands, and high altitude lands). This would increase the likelihood that technologies chosen would fit the ecological setting of the development site.

Interdisciplinary analysis: The systems in which AID projects intervene are complex and changes are likely to result in cross-sectoral conflicts. Thus, the tasks of preproject analysis and project evaluation usually require the knowledge of several types of specialists such as sociologists, ecologists, and soil scientists as well as the experience and knowledge of local people who represent the sector to be affected. The analytical methods for bringing this information together for presentation to engineers, economists, and decisionmakers is the specialty of environmental analysts. Thus, adequate planning often necessitates use of interdisciplinary teams guided by environmental analysts. However, teams of consultants and staff fielded by development assistance agencies too seldom accomplish this. Project officers generally have neither the correct technical backgrounds nor ready access to sufficient inhouse technical personnel to facilitate adequate interdisciplinary environmental analysis.

Interdisciplinary cooperation seems unlikely to occur without staff incentives and an organization structure explicitly designed to encourage such teamwork. The development assistance organizations might increase their support for development of interdisciplinary planning and analysis expertise, and expand support for development of techniques that might facilitate and streamline interdisciplinary planning.

Improve project planning and increase project flexibility: Assistance projects that intervene in a developing country's natural resource base require careful and perhaps extensive planning. In most cases, the scientific knowledge base is from temperate regions whereas the development site often is tropical. Further, the recipient culture and economy tend to differ substantially from those of the project designers, making it difficult to predict what types of projects are likely to be adopted. Most development projects, then, are at least in part experiments and must be designed to accommodate unidentified changes.

Risks to natural resource systems and development assistance recipients may be reduced where projects include an extended technical planning phase, a gradual phasing in period for adaptation of technology to the site's ecological and social conditions, and have a length commensurate with achievement of results despite likely midterm project realignment. However, internal organization goals, to keep funds moving and to achieve measurable results quickly, operate against these approaches. Further, short project duration makes it difficult to introduce technologies or implement projects gradually, and presents a serious obstacle to making midterm corrections in response to monitoring and evaluations. Instead of today's common three to five-year AID projects, durations of 10 to perhaps 20 years seem more appropriate.

Improved use of project evaluations: Midterm and final project evaluations are little used to improve AID and World Bank technology decisions. Even when evaluations are broad enough to observe external effects, and are conducted long enough after project completion to determine ecological sustainability, evaluations seldom address faults with the original problem identification and project design. Yet, this is the time when, with the benefit of hindsight sharpened by project experience, important lessons can be learned.

Analysis of existing evaluation reports could identify important environmental and cultural interactions that determine whether technology interventions will be maintained after the project is completed. Evaluation procedures could be modified to improve identification of causes of development project success and failure and to assess effectiveness of environmental mitigation proposed during project planning and midterm evaluations. In addition, evaluations could be designed to create a feedback system for project officers and design teams.

INTRODUCTION

The question posed by Congress and addressed by this study may be stated as follows:

How can international development assistance agencies improve their ability to choose technologies that are compatible with biological and physical conditions at the sites where the technologies are to be implemented?

For the purposes of this study, technologies will be considered compatible with biological and physical conditions if they support and prolong the contributions of local natural resources to the provision of goods and services for human consumption. Such technologies will be called "ecologically sustainable technologies."

Finding an answer, and instituting the solution or solutions, does not imply eliminating or even minimizing the potential for adverse environmental impacts from development assistance projects. These can occur from the failure to transfer the technology to the practitioners, and from failure of the development projects for reasons other than the ecological sustainability of the chosen technology (see figure E-1). Even when choosing a particular technology, further questions are relevant, such as:

- Are the eventual practitioners likely to have cultural aversions to the technology?;
- Is the technology within the means of these practitioners?; and
- Will governmental or other institutions provide the necessary support to ensure continued operation of the technology in a manner appropriate to local conditions?

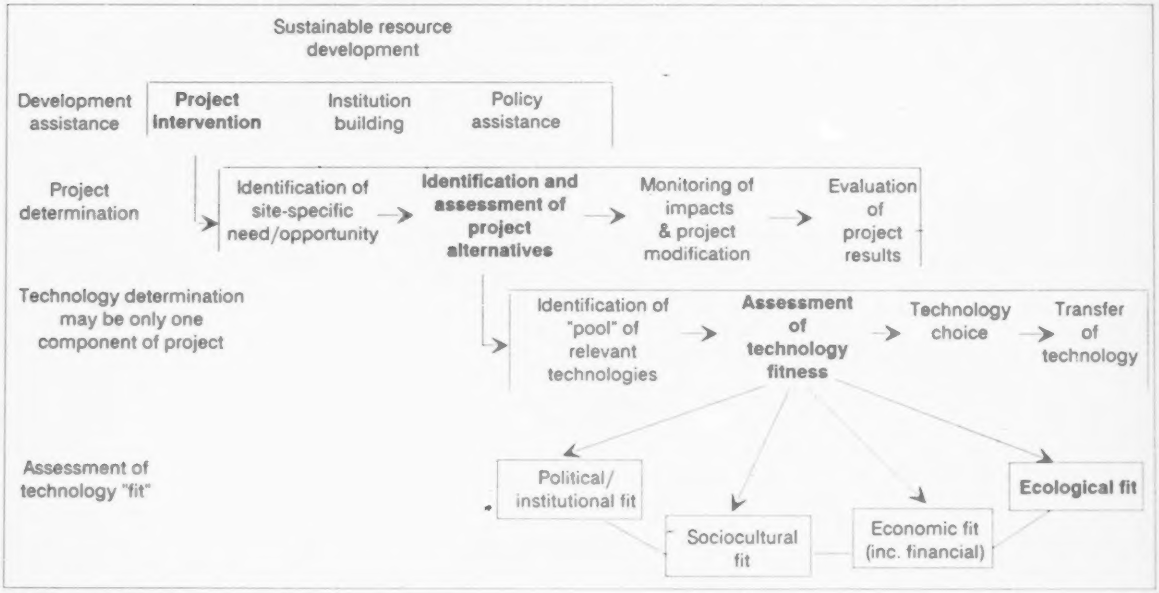
Thus, to minimize the possibility of adverse impacts from development assistance activities in general, one must address a considerably broader arena of issues than just technological/ecological fit. Such a study, however, is beyond the request at hand, and the resources for this Staff Paper.

The Ecological Underpinnings of Development Assistance

Development assistance interventions commonly are designed to facilitate development of human and natural resources in recipient countries. Three general modes of intervention are 1) tangible project intervention, 2) local institution building, and 3) policy assistance (see figure E-2). In aggregate, these interventions are designed to assist developing countries to establish institutions for orderly improvement of the quality of life, to effect policy changes needed for satisfactory project performance, and to undertake investments that are properly engineered, financially feasible, and economically and environmentally sound.

Views of the relative importance of the three types of development assistance are mixed. The Environmental and Energy Study Institute (EESI) study and the Science and Technology Committee's request to OTA indicates that the primary focus of development assistance—projects and programs—can visibly, tangibly affect the quality of life and environment in developing countries. These activities also have important interactions with developing country environments. However, project interventions can beneficially *or* adversely affect how renewable resource systems are used, the benefits derived from them, and the impacts of their use on other communities or future populations. Thus, while such activities probably should

Figure E-1—The Role of Technology/Ecology "Fit" in Development Assistance


Sustainable resource development
Development assistance
Project intervention
Institution building
Policy assistance
Project determination
Identification of site-specific need/opportunity
Identification and assessment of project alternatives
Monitoring of impacts & project modification
Evaluation of project results
Technology determination may be only one component of project
Identification of "pool" of relevant technologies
Assessment of technology fitness
Technology choice
Transfer of technology
Assessment of technology "fit"
Political/ institutional fit
Sociocultural fit
Economic fit (inc. financial)
Ecological fit

SOURCE: Office of Technology Assessment, 1987.

continue to be a major focus, they should be designed specifically to minimize the potential for adverse impacts.

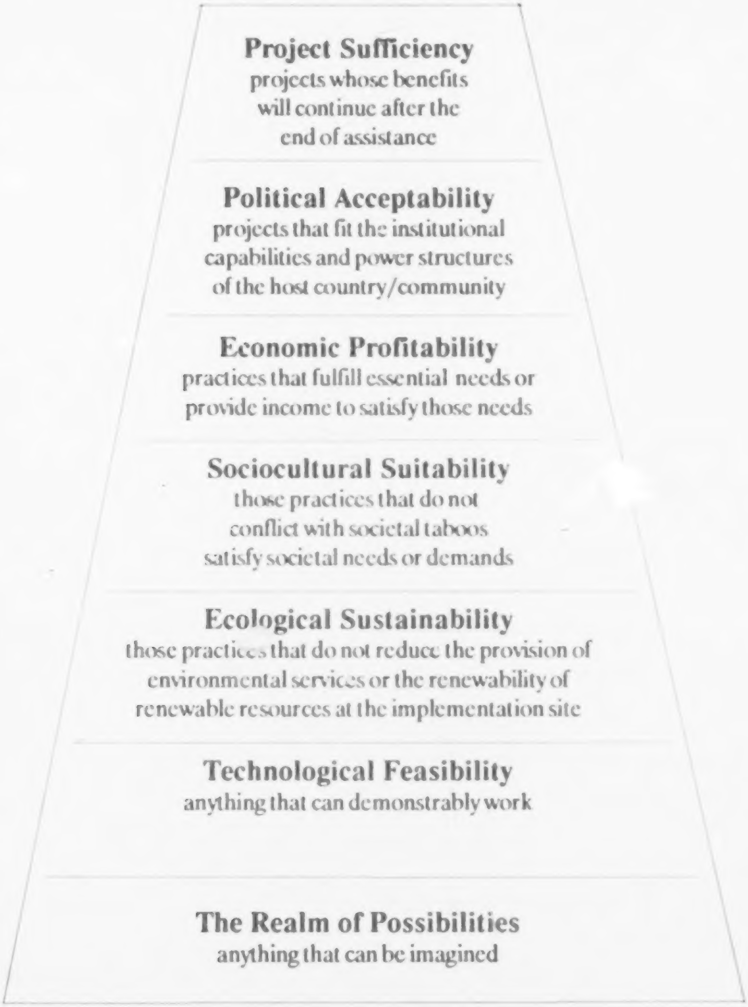
A second view is that development assistance can contribute only marginally to the damage or conservation of natural resource systems, because the scope of resource system abuse generally is so much greater than the scope of development assistance projects and programs. Therefore, to promote resource conserving technologies effectively, assistance agencies must use their influence to encourage governments to design and enact policies that will reward resource conserving development and discourage resource-wasting development. The extent of influence is usually related more to the level of general support funding an agency provides than to the specific development assistance projects it sponsors. Support for the second view is growing at the U.S. Agency for International Development (AID) and the World Bank, where it is thought to have a potential at least equal to that of improving the environmental soundness of sitespecific projects.

The third approach is based on the perception that, while project interventions and support for policy development can have substantial impacts, the only means to ensure that development be widespread and appropriate to the local needs and conditions is for development activities to be defined, planned, and implemented by the assistance recipients themselves. Thus, proponents argue that ensuring local participation in all phases of project assistance and emphasizing local institution building projects is fundamental to longterm development. Support for this approach is well-based in U.S. nongovernmental organizations, and is growing in development assistance organizations.

In practice, no clear lines can be drawn between the three types of assistance: developing local institutional capabilities may require and be accompanied by policy assistance grants and loans, and projects may have institution-building components. Indeed, institution-building itself can be seen as a project. Thus, the three types are complementary and the balance among them in development assistance can only be determined on a case-by-case basis.

The purpose of the tangible project interventions usually is to improve the wellbeing of some target population by causing a prolonged increase in production of goods or services. Thus, many of these projects are related directly to resource use and include activities such as agricultural intensification or expansion, dam-building, etc. Such interventions often include introduction of new technologies or improvement and expansion of existing ones.

Figure E-2—Hierachy of Criteria for Sustainable Development



Project Sufficiency
projects whose benefits will continue after the end of assistance

Political Acceptability
projects that fit the institutional capabilities and power structures of the host country/community

Economic Profitability
practices that fulfill essential needs or provide income to satisfy those needs

Sociocultural Suitability
those practices that do not conflict with societal taboos satisfy societal needs or demands

Ecological Sustainability
those practices that do not reduce the provision of environmental services or the renewability of renewable resources at the implementation site

Technological Feasibility
anything that can demonstrably work

The Realm of Possibilities
anything that can be imagined

SOURCE: Office of Technology Assessment, 1990.

Clearly, selection of appropriate development interventions must be based on a number of development site conditions. Development assistance organizations have identified that the specific sociocultural, political, economic and ecological conditions of a development site create the framework into which their efforts must be integrated. Regardless of the cause of resource degradation or damage, developing countries generally cannot afford even temporary decline in the food or foreign exchange derived from their natural resources, and lack sufficient economic resources to implement reclamation or restoration activities. Thus, selection of ecologically appropriate technologies becomes imperative.

Successful interventions depend on the existence of the conditions necessary to support the new, improved, or expanded technologies. Compatibility of the technology with local ecological conditions is prominent among these. Development interventions sometimes have failed because ecological compatibility has not been assured. Consequences have included irrigation canals filled with silt, rangelands degraded by expanded cattle herds, or settlements abandoned because of declining soil fertility. Thus, *the problem is to develop technologies that are ecologically sustainable under the political, social and economic conditions that will prevail when assistance has ended.*

The Agencies' Response

Over the past decade, the U.S. Agency for International Development (AID) and the World Bank have developed procedures designed to incorporate certain environmental considerations in their assistance activities. Despite progress, however, the agencies' abilities to identify ecologically sustainable resource development interventions still are frequently criticized.

A 1975 lawsuit brought against AID by the Environmental Defense Fund, Inc. culminated in Agency compliance with the National Environmental Policy Act (NEPA). As a result, AID established well-defined environmental procedures and a small cadre of environmental officers to screen projects for significant environmental effects and to focus planning attention on likely negative impacts of development projects.

Amendment of the Foreign Assistance Act in 1977 mandated that AID increase investments in projects and programs explicitly intended to conserve as well as develop the productivity of developing countries' renewable natural resources. AID responded with numerous programs designed to enhance client country abilities to manage resource development, and projects addressing some immediate symptoms of resource deterioration. Examples include the AID Country Environmental Profiles program, and the numerous AID projects that sponsor distribution of tree seedlings and technical assistance to farmers on "fragile lands."

The World Bank also developed a process to focus planning attention on projects likely to have significant environmental impacts (e.g., construction of large dams, roads that penetrate forests, and extractive industries). The Bank has had a small environmental office since 1970 to screen proposed projects and alert project officers when detailed scrutiny of environmental impacts seems warranted.

Recently, Bank officers have begun to evaluate the relationships between economic policies and resource use practices in certain countries. If these analyses reveal how national policies could be changed to enhance ecodevelopment, the Bank then may promote such changes in its policy dialogues and offer support through sectoral loans for natural resources. Finally, the Bank's current reorganization is expected to strengthen the bureaucratic status of its environment operations while establishing positions for natural resource professionals in regional offices, thus giving them a more direct role in project identification and design.

WHY ECOLOGICALLY INAPPROPRIATE TECHNOLOGIES MAY BE SELECTED

Introduction

Mismatches between ecological conditions and technologies promoted by assistance organizations is currently receiving the attention of Congress and a number of public interest groups. This concern is expressed in the EESI report and summarized in the Committee's request letter. Therefore, no detailed review of evidence for the problem is included here. In OTA's interviews, no one denied that the problem existed, although opinions differed on its relative importance. The evidence, in fact, is largely anecdotal: few recent cause-effect analyses of development project successes and failures have carefully investigated the issue of matching technologies to environment.

Interviews for this study and the relevant literature indicate that at least three broad factors contribute to the use of ecologically inappropriate technologies. These are:

- Few, if any, sustainable technologies exist to satisfy development needs at many sites. So technologies that worked elsewhere under different conditions are chosen and some of these prove unsustainable.
- Sustainable technologies, in some cases, do exist and have been demonstrated, but unsustainable technologies still are implemented.
- Experts responsible for informing decisionmakers sometimes are unable to recognize which technologies will be sustainable.

Where Sustainable Technologies May Not Exist

Most developing countries are located in the tropical latitudes. Here, the common problems of rainfall extremes or irregularities, high temperatures, and lack of seasonal reduction of insects and parasites make natural ecosystems highly susceptible to self-reinforcing cycles of degradation.[1] Such vicious cycles are easily triggered by attempts to develop and use the local natural resources. Most technologies used to get high yields of goods and services from soil, vegetation, animals, and water resources have been developed in temperate regions where natural systems are generally more resilient. However, when transferred without appropriate adaptation to tropical areas, they tend to disrupt ecosystem functions beyond natural regenerative capabilities, thus reducing current and future productivity.

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[1] Degradation of ecosystems involves physical, chemical, and biological processes set in motion by activities that foster reduction in the system's inherent productivity. For example, hillside deforestation in the humid tropics commonly leads to accelerating soil erosion, decreasing soil fertility, and disrupted hydrologic cycles. These changes, in turn, can promote further reduction in ecosystem productivity through decreased natural plant regeneration, establishment of weedy plants that displace more desirable plant species, and increased hazards to public health.

Further, many technologies that could be ecologically sustainable commonly require resources not readily available in developing countries. For example, the Near-East and Pakistan have, although not tropical, harsh environments for which ecologically sustainable technologies are few. Although much western U.S. agriculture and water management experience is relevant to development in these areas, U.S. technologies often are not suitable within their political, social and economic framework.

Similarly, principles of science and logic often can be used to make marginal improvements in long-sustained traditional technologies or to adapt technologies that have worked elsewhere. If the design is good and appropriately applied, such technologies can conserve the natural resource base. However, such adaptations of technology can become unsustainable if cultural or financial factors prevent correct application.

In cases where ecologically sustainable technologies suitable to the sociocultural framework do not yet exist, development assistance options include: 1) support for research to develop ecologically sustainable technologies, 2) definition of development goals that can be met with technologies known to be ecologically sustainable (e.g., reducing risk or improving distribution of goods and services may be more appropriate goals than increasing production), and 3) gradual technology modification with careful monitoring to reduce the risk to affected people and natural resource systems. In practice, however, project time frames and objectives often preclude such gradual development.

Where Unsustainable Technologies Are Chosen

Sustainable technologies, in some cases, are rejected in favor of approaches that are expected to achieve other, overriding goals. Thus, technologies may be chosen for which sustainability is unproven, or those known to be ecologically, culturally, or financially incompatible with local conditions. For example, although many traditional technologies are ecologically sustainable, production gains from these may not seem adequate to resolve the identified development problem.

A variety of other reasons are given for support of projects known to deplete renewable resources rapidly. For example, an emergency condition may seem to necessitate immediate action using technologies which do not fit the local environmental conditions. Similarly, short-term economic or political goals may override ecological goals. Examples include forests cleared for timber and cattle exports to meet short-term foreign exchange requirements, and settlements established to curtail nomadism or to secure boundaries.

Choice of technology also can be skewed by economic analyses which value immediate, although perhaps only temporary, benefits more highly than distant costs and benefits.[2] For example, the present value of temporary production gains (e.g., from a reservoir) can be shown to be higher than the worth of an unending stream of modest benefits from current resource uses (e.g., subsistence agriculture). Or, for highly subsidized projects, the rationale is either that the temporary effects will resolve a significant development problem, or perhaps that foreign source subsidies can be continued indefinitely.

Such decisions in favor of unsustainable technology can seem rational. However, great care must be taken to assure that:

- the development problem has been correctly identified;
- the benefits and costs, including cross-sectoral conflicts, are fully accounted;
- the lifetime of the project has been correctly estimated;
- the project will be subsidized long enough to achieve its intended objectives; and
- the project include a monitoring component to ensure that recipients are protected from adverse impacts.

Where Sustainability Is Not Determined

No single individual is likely to have adequate technical knowledge to assess thoroughly whether a proposed technology will be compatible with the political, cultural, economic, and ecological conditions of the development site. However, development assistance projects often have relied on technology choices made without adequate interaction among all the necessary types of experts.

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[2] The Congressional Research Service recently conducted a workshop reviewing the state of the art in incorporation of environmental considerations into benefit-cost analyses. The draft proceedings are under review.

World Bank and AID consultants now used for planning generally are members of a multidisciplinary group.[3] But whether such groups perform interdisciplinary analysis[4]—identifying the interactions between environment, technology, culture, and financial conditions—is less apparent. Without interactive, interdisciplinary analyses, it is unlikely that predictions of compatibility with local site conditions can be made with assurance. Thus, technologies may be promoted based on "best guesses," which by definition sometimes will be wrong.

CONDITIONS INTERNAL TO DEVELOPMENT ASSISTANCE ORGANIZATIONS THAT PERPETUATE INAPPROPRIATE TECHNOLOGY CHOICE

Introduction

Some causes for inappropriate technology choices are perpetuated by development assistance agencies themselves. Other, generally more powerful causes for poor technology decisions are problems of values, personnel resources, economic and bureaucratic structures, and economic/financial constraints that exist in developing countries. However, technical, financial, and analytical assistance profoundly influence policies and technology decisions in developing countries. Thus, conditions internal to development assistance agencies can be significant contributing causes of development success or failure.

Although perceptions differ as to appropriate modes of development assistance, a remarkable consensus exists on the major internal factors that constrain an assistance organization's ability to match technologies to development site environmental conditions. A major constraint has been a lack of internal commitment to the concept that renewable resource conservation is a necessary condition for development success. AID, the World Bank and other multilateral development banks (MDBs), and Federal agencies with international activities, have individuals strongly committed to the importance of integrating conservation and development. However, for most development officers this has not been a high priority. Policies and procedures addressing environmental soundness generally have not come from intellectual consensus within the agencies, but rather have been formed in reaction to outside pressure, particularly from Congress. Internal factors inhibiting an aid organization's ability to consider fully environmental conditions in carrying out development assistance are summarized in Box E-1.

Conflicting Goals

Several time-driven goals of development agencies operate strongly against allocating the planning time necessary to determine which technologies are compatible with ecological conditions of the development site. Prominent among these is the need to *keep funds moving.* For AID, pressures to spend money come from the Department of State, Office of Management and Budget, and from the annual budgeting process—where large amounts of money have to be obligated each year or else they are "lost." For the World Bank, pressure comes from client countries and from organizations providing capital for jointly financed projects.

The goals that influence personnel activities the most are those with deadlines for clearly discernible achievements. Thus, the goal to commit and spend money within a given year can be expected to receive greater attention than the goal to develop a project likely to be successful within the complex workings of the natural resource base, the host economy, and the host society.

Another time-driven goal for development organization personnel, and as a result for their contractors, is to *achieve measurable results quickly.* For multilateral bank personnel, the pressure arises from the fundamental fact that banks must operate as banks. Even when loan rates are highly concessionary, benefits from investments made with borrowed capital must soon begin to match debt costs. Final evaluations ultimately focus on a project's economic success as measured by the direct economic rate of return.

Even though project officers are strongly aware that their performance on achieving the above-mentioned goals largely will determine their career progress, related goals also are important. In AID, for example, many officers believe that career rewards accrue to those who can *design and initiate numerous projects each of which outwardly addresses many of the agency's many priorities.* Part of these motivations are perceived to come from Congress, because AID personnel frequently are requested to enumerate projects with objectives that match

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[3] Multidisciplinary planning implies that specialists of several disciplines contribute to the completed plan. However, it does not imply that they work together to identify and resolve cross-sectoral conflicts between their separate analyses.

[4] Interdisciplinary planning and analysis implies that the specialists of several disciplines interact within the framework of a tested method to assure that the overall analysis is internally consistent and that foreseeable conflicts are identified and resolved. Typically such analysis requires a team member trained in interdisciplinary analysis techniques.

Box E-1—General Internal Constraints That Inhibit Full Consideration of Environmental Conditions in Development Assistance

- Agency policies shift often (AID).
- Agency has too many high priorities (AID).
- Few projects last long enough to accomplish significant development goals (AID).
- High staff turnover (AID).
- No career path exists for environment and natural resource professionals (AID).
- Heavy and increasing bureaucratic workloads are compounded by inadequate staff support services (AID).
- Too few in-house staff have knowledge about how technologies interact with ecological and cultural conditions (AID; World Bank).
- Inadequate numbers of staff are professionally trained in environment and natural resources (AID; World Bank).
- Existing in-house expertise in environment and natural resources is underused because of inappropriate assignments and job descriptions (AID).
- Selected contractors often lack strong expertise which facilitates linking technology and environment indeveloping countries (AID; World Bank).
- Agriculture and environment are not clearly linked by agency structures, procedures, and practices; agencies provide little incentive to link them (AID; World Bank).

SOURCE: Interviews.

current congressional and constituency interests. The officer who designs and initiates a project seldom sees it through to completion and is unlikely to be recognized for the ultimate success or failure of the project. Little incentive exists for recognizing mistakes and learning from them.

The time-driven goals can directly preclude sound technology choices. For example, because the ecology of tropical estuary ecosystems is poorly known, sustainable interventions for port development usually cannot be designed without preliminary investigations covering an entire yearly cycle of seasons. But the time-driven goals seldom allow such lengthy preliminary studies, so decisions must be made with incomplete information. Commonly, these decisions are based on the personal experience of the engineer or other technical planner in charge. That experience too often is inadequate to assess correctly how the technology, environment, and local society will interact.

Potential Oversight Questions:

- *Increased interdisciplinary planning might result in more successful development projects. But it might also slow obligation of an agency's budget. What do you perceive as the possible beneficial and adverse impacts on your agency if your actions to improve the number of project successes result in funds remaining at the end of the year?*
- *To what extent does your agency use the environmental plans developed under the auspices of the Organization of American States (or other similar organizations) in your project planning process?*
- *What other mechanisms allow you to carry out adequate planning without hindering timely expenditure of your budget?*

Narrow Evaluations and Poor Feedback

Development assistance banks' criteria and procedures for evaluating projects also tend to perpetuate the causes of poor technology choice. The overriding bank criteria for project success are narrowly focused financial and economic measures of project benefits and direct costs. External costs may be noted in evaluation documents, but seldom are they weighed against benefits.

The World Bank has been a leader in development of careful financial and economic post-project evaluations. Project sustainability is assessed in financial terms: will necessary continuing investments be made after the funding period ends? In this regard, the Bank's evaluations seem to be thorough, with a significant proportion of projects frankly assessed as either not sustainable or dubious at the time of the final evaluation.[5] However, Bank evaluations seldom include thorough consideration of environmental or social impacts. Recently, Bank evaluations have been self-critical in this regard. In addition, project impacts on natural resource sustainability commonly are not recognized in World Bank evaluations. A current review of completed Bank-supported dam/reservoir projects may bring increased attention to this issue, as many of the reservoirs are reported to be deteriorating rapidly.

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[5] The economic implications of unsustainable projects for the client country, which remains liable for the debt, usually are not addressed.

AID objectives and criteria for project evaluations are specified early in the planning process and commonly are broadly stated in terms of institution building processes (e.g., number of extension-agent visits, number of students educated), or direct measures of accomplishment (tree seedlings distributed, gains in farm income). Thus, evaluations are not narrowly financial and economic. However, the evaluations seldom are broad enough to identify external effects, or conducted long enough after project completion to determine ecological sustainability. Further, final evaluations seldom address faults with the original problem identification and project design. Yet, this is the time when, with the benefit of hindsight sharpened by project experience, important lessons can be learned.

In spite of their shortcomings, evaluation procedures are institutionalized and the reports generated contain many potentially valuable lessons which could be applied to improve future projects. Also, end-of-project evaluations could be used in a motivation system that would reward development success and provide accountability for development failure. Even so, aid agencies have not learned to use these evaluations effectively. Indeed, negative evaluations tend to disappear due to political pressures and delay.

At the World Bank, post-project evaluations are conducted regularly by an office separate from the project implementing office. Annual summaries of these evaluations are widely distributed in the Bank and used to train Bank staff and client country trainees. Summaries are available for official use in donor and client countries, but are not widely distributed outside of the Bank. A rationale for strictly limiting circulation of evaluations is that, written as frankly as they are, they might embarrass clients or donor country individuals. This, in turn, could hinder efforts to foster policy improvements in client countries or willingness to participate in development assistance. However, distributing the reports more widely might improve the quality of guidance that nongovernmental organizations offer the Bank, directly and through Congress.

Nevertheless, feedback from the Bank's evaluations to its project design process seems to be inadequate; similar types of project failure sometimes are identified in subsequent years. Livestock project failures in Africa are an example. Contractors and client country nationals who design Bank supported projects may not be encouraged to study reports from past projects or warned of the economic consequences of project failure to the recipient country.

End-of-project AID contractor reports, written by the organization that implemented the project, commonly contain a wealth of technical detail and often include description of social and environmental causes of project success or failure. Commonly these technical end-of-project reports are short on the analysis and synthesis needed to derive lessons for future projects. Report drafts are critiqued by the Agency's project officers and other interested parties, and may be revised accordingly. The reports then are filed with other project papers. Technically they are available to host country personnel and outsiders in addition to AID personnel and contractors involved with current projects and preparing for future ones. In practice, they commonly are distributed among technical managers of similar AID projects within the country where they are written, but otherwise are an underused resource. Their shelf-life is far shorter than their potential utility because of narrow distribution, unwieldy length, unattractive format, and lack of editing

AID's Program and Policy Coordination office (AID/PPC) tracks agency projects, the nature of technologies used in various geographic regions, and many other evaluation parameters. It produces syntheses of project evaluations, drawing lessons from multiple experiences. The number of these syntheses now available not only within AID but to the broader government and nongovernment community is increasing steadily. However, these are another underused resource. Contractors and host country counterparts generally have little time to study evaluation reports or the unsynthesized end-of-project technical reports for projects in which they are not personally involved. Thus, the agency continues to reinvent some successes and repeat some mistakes. Finally, AID has no formal program for reevaluating completed projects at a time long enough after completion to learn the real determinants of sustainability.

Potential Oversight Questions:

- *Does your agency conduct post-hoc evaluations of its development assistance projects? If so, for what kind of projects are such evaluations conducted? How long after project completion does such evaluation occur? What have such evaluations revealed about how to change development assistance to increase the likelihood of interventions being ecologically, culturally, and financially sustained?*
- *How would an analysis of your existing evaluation reports benefit your agency and Congress' ability to cooperate in development of foreign assistance policy?*

- *Does your agency conduct generic program evaluations? On what subjects has it completed these evaluations (e.g., irrigation, rural development)? What changes have been made in subsequent programs as a consequence of lessons learned?*

Inappropriate Staffing

Development assistance agencies' technical staffs were comprised mainly of agronomists and engineers during the 1950s and 1960s. By the mid-1970s, technical specialists decreased in number on agency staffs and, especially at the Banks, economists began to dominate. More general types of development assistance began to compete with technical project assistance.

Awareness of the potential for environmental conflicts also arose in the early 1970s. Subsequently, the World Bank and AID established small cadres of environmental professionals and retained some technical specialists despite the continuing trend towards hiring generalists for staff positions. While project officers often function as generalists, technical experts are contracted for project design, implementation, and evaluation. The generalists, with some support from the small cadre of resource professionals, are expected to have sufficient knowledge to assure recruitment of appropriate specialists, who in turn will develop the technical and social information and conditions needed for development success.

To enable generalists to carry out this function, detailed guidelines and checklists for environmental evaluation have been developed at the World Bank, other MDBs and bilateral aid agencies. In AID, a sign-off procedure to assure scrutiny of potential environmental effects of projects considered likely to have negative impacts culminates with approval by an environmental officer. AID and World Bank environmental officers further provide advice to project officers on consultant selection and review contractor reports to identify significant environmental issues. However, neither organization has had a sufficient number of environmental officers to assure agency-wide guidance.

Potential Oversight Questions:

- *In your entire professional staff, what are the percentages of officers with degree-level academic training in each discipline, such as economics, agriculture, ecology, forestry, geography, anthropology, medicine, public health, civil engineering, etc.?*
- *How frequently have your officers been retrained in the advances of their discipline or cross-trained to learn about scientific advances in biological or physical sciences?*
- *What percentage of each of these professional groups are assigned to positions where most of their time is spent applying their special training?*
- *Can you provide a list of personnel assigned to environment or natural resource functions that briefly indicates each person's responsibilities and technical qualifications for that position?*

Structural and Procedural Constraints

The primary concept of "environmentalism" during the 1970s was that negative impacts of resource development should be avoided. Thus AID, the World Bank, and other development agencies did not organize their environmental offices to identify resource development opportunities. Rather their function was primarily to determine which of the planned interventions were likely to have harmful environmental impacts, and to insist on design changes that would mitigate such impacts. Given the compelling time-driven goals motivating most activity in these organizations, it was probably inevitable that the environmental officers would be widely viewed as adversaries and their involvement would be avoided when possible.

Most project or loan officers generally work within well-established time constraints, and thus, various methods have evolved to avoid the in-house environmental officers. For example, a project officer may not find time to cooperate in detailed review of a project's environmental aspects. Environmental staff input can be avoided when recipient country officials, desirous of getting a project started, signify that there are no environmental implications requiring study. In the World Bank, the environment office has had the responsibility to review all project documents, but that office has operated from the sidelines with a minuscule staff compared to its task. It has often not been in a position to provide constructive input to project design and operation.

Potential Oversight Questions:

- *The heavy workloads of your project officers, the deadlines for processing large amounts of money, and the pressures from Congress and others to reach objectives quickly must all discourage full investigation of the likely environmental impacts of projects. Are the kinds of projects likely to need full environmental evaluation avoided to save time?*
- *What steps has your organization taken to encourage officers responsible for project identification, design, and*

implementation to seek participation of in-house natural resource specialists and environmental analysts?

Environmental procedures in AID, being a legal requirement, have had significantly more force than has simple policy at the World Bank. Avoidance of environmental concerns today is difficult in AID. Some years ago a simple statement denying that adverse impacts were likely often could suffice. But the gradual increase in environmental officers with professional expertise has discouraged this practice.[6]

AID officers having environmental charges are located in each geographical bureau and in Missions abroad as well as in the central Bureau for Science and Technology Bureau (AID/S&T). Professional environmental personnel in AID/S&T carry out a number of programs designed to raise environmental awareness among AID personnel and host country decisionmakers, and to encourage officers in AID bureaus and Missions to use environmental analysis early in the formation of development assistance strategies. Country Environmental Profiles sponsored by AID, for example, go beyond the impact assessment level of environmental concern to promote integration of development and resource conservation. Still, with the present structure, AID's continuing progress in integration of conservation and development depends on:

- the extent to which staff exhibit a commitment to environmental analysis and programmatic investment in environmental management as a necessary condition for development project success, or
- ID being "micromanaged" by Congress to force it to consider impacts on the environment.

AID activities now seem to focus increasingly on incorporating natural resource considerations into regional and sector strategies, suggesting that AID personnel are adopting the premise that environmental analysis is a necessary element of economic development. The AID/S&T Agriculture Office is leading an effort to develop a new focus for AID agricultural assistance, which explicitly includes maintaining the productivity of the natural resources on which agriculture depends. Another AID/S&T program promotes a cooperative effort among Missions in Latin America to focus development efforts on fragile lands. AID/PPC is revising its guidelines for economic and financial analysis of projects to take environmental impacts into account. Finally, the Africa Bureau is working intensively on a development assistance strategy focused directly on natural resources. While some of this activity may be a reaction to a perceived threat that appropriations will be further earmarked for environment and natural resource purposes, the activities seem largely to be internally motivated.

The causes of poor technology choice are perpetuated not only by structure but also by agency procedures. The weak feedback links between project evaluation and design already have been noted. Other internal constraints on sound technology decisions include:

- too little permanent staff involvement at the development site;
- use of consultants and organizations with inadequate technical expertise; and
- bureaucratic procedures that discourage interdisciplinary collaboration.

Too Little Permanent Staff Involvement at the Development Site

At AID, the size of the bureaucracy is limited strictly in order to control overhead on development assistance spending and in response to a keen awareness of congressional and public concern regarding "bloated" bureaucracies. Thus, each project officer typically manages several projects. These officers design development assistance strategies, oversee project design, manage cash and paper flows to and from contractors or hostcountry organizations, and assure that evaluations and other procedural steps for each project are on time and complete. These heavy workloads typically prevent their active involvement at the sites of development projects.

Further, AID project officers generally have weak administrative support and restricted travel funds. AID project officers stationed in Washington DC cannot use project funds for project management activities, such as travel or secretarial support. These constraints may be less severe in AID's Missions, but the existing bureaucratic requirements of managing several projects can keep an officer at his/her desk most of the time. Thus, the amount of time project officers can spend onsite usually depends more on their ability to capture office resources and personal willingness to go into the field than on the management needs of the project.

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[6] To avoid environmental regulations, some AID bureaus and missions are reported to have reduced investment in the types of projects that intervene in resource use, such as irrigation development. This results in increased funding for projects such as research and institution building, that are not required to include detailed consideration of environmental effects. Such reactions to environmental regulations, though difficult to document, could have significant adverse impacts on activities needed to address certain natural resource problems.

Potential Oversight Question:

- *How would your organization's efficiency be affected if expenses for staff management of projects, such as direct-hire staff travel to project sites, could be charged against the budgets of the projects?*

Use of Consultants and Organizations With Inadequate Technical Expertise

The procedures and workloads that severely restrict the onsite activities of AID staff increase the likelihood of project failures. Most technology decisions ultimately are made either by contractors or host country personnel. Even where technology decisions rest with host country personnel, contractors often have substantial indirect influence through the options they present. Staff officers write terms of reference for contractors, influence the choice of contractors, modify the terms (or decide not to do so) per suggestions from contractors or host country officials, and approve the contractors' activities. However, with inadequate opportunity for field level involvement, the staff are unlikely to be fully competent for these functions.

The World Bank uses many consulting teams for project identification, design and evaluation, and Bank officers provide lists of potential contractors to client country officials for project implementation. The World Bank maintains a formal consultant roster which can be searched to develop lists of individuals and organizations who seem to meet various criteria of disciplinary and geographic area expertise and development project experience.[7] AID/S&T has established similar computerized rosters of environment and natural resource specialists appropriate to design or implement projects for developing countries.

In practice, World Bank and AID consultants probably are chosen more often from informal systems based on project and loan officers' experience than from rosters. No mechanical system can be relied upon to judge the all-important personality factors that will determine whether a consultant successfully completes the terms of reference. From the project officer's perspective, the selection of contractors who will complete project design and evaluation jobs on time is critically important to achieving bureaucratic goals. Coupled with the project officer's heavy workload, this usually means using consultants whom the officer or his/her close associates have used previously, and ones that are not likely to cause unexpected delays in moving the project forward.

Officers without appropriate technical backgrounds for selecting technical consultants need to have ready access to in-house technical experts. In AID, this expertise is provided by technically trained AID personnel, in-house contractors, and technical experts loaned to AID by other government agencies through Participating Agency Service Agreements (PASAs). Further, officers are required to seek assistance from the agency's environmental officers where off-site environmental impacts are an issue. World Bank officers also have used expert assistance routinely to choose consultants, but have not been required to seek such assistance from the environmental office. The Bank's reorganization is intended to increase the availability of in-house natural resource and environmental specialists.

Often, local institutions can be identified and funded to carry out planning and evaluation tasks. International programs through which developing country nationals with ecological qualifications can be located have been sponsored by the United Nations Education, Science, and Cultural Organization (particularly the Man and the Biosphere Program), by the United Nations Environmental Programme, and by such nongovernmental organizations as the World Wildlife Fund (U.S. and International), International Union for the Conservation of Nature and Natural Resources (IUCN), and the Nature Conservancy. Some of these, such as IUCN's Conservation Data Centers have rosters of experts in developing countries sorted according to skills needed for particular types of development activity. But these mechanisms are now used mainly by European (principally Scandinavian) bilateral agencies.

Bureaucratic Procedures That Discourage Interdisciplinary Collaboration

Interdisciplinary planning seems necessary for improved matching of technologies to the natural resource, social and economic conditions at development sites. This depends first on the agency choosing the right group and writing adequate terms of reference, and secondly on the team leader's capabilities. Integration of disciplines often is not achieved because the team leader and project officer have not been trained or lack experience in techniques of interdisciplinary team management and analysis. Wrong consultants are chosen in some cases, and their interaction is not facilitated; for example, the anthropologist, the agronomist and the economist of a multidisciplinary team may each visit the development site separately.

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[7] World Bank consultant rosters favor individuals and firms in OECD countries. This does not seem to be in keeping with Bank policy developing country role in the development assistance process.

The need to develop interdisciplinary teams applies just as much to development assistance agency staffs as to consultants. Workloads, bureaucratic structures, and procedures all discourage integrated analyses of development problems and projects. Thus, for example, cooperation between agricultural and environmental personnel largely is inadequate.

This is not just a problem of agriculturalists or economists having learned to view environmentalists as adversaries. University training in natural resource and environmental sciences typically produces technical experts who cannot speak the language of economists and who have only superficial knowledge of agriculture and engineering issues. Thus, interdisciplinary cooperation seems unlikely to occur without staff incentives and an organizational structure explicitly designed to encourage such teamwork.

Experience with AID's Country Environmental Profiles, with Organization of American States' (OAS) environmental studies, and with development of national conservation strategies in several countries indicates that interdisciplinary teams often can be recruited in the host country. However, a shortage of persons trained in the techniques of interdisciplinary team management, and in cross-sectoral assessment methods (other than economics) is likely to be a significant constraint as development assistance agencies seek to increase use of interdisciplinary techniques.

Potential Oversight Questions:

- *OAS, AID, and other organizations supported by U.S. foreign assistance have developed techniques for interdisciplinary, cross-sectoral analysis of development problems, intervention options, and technology soundness. What part of your organization's assistance strategies, projects, and programs are designed by using these new interdisciplinary techniques?*
- *What Participating Agency Service Agreements that are intended to enhance AID's environmental expertise remain in force? How has the usefulness of these PASAs' been evaluated? Is AID investigating creation of similar PASAs with agencies not currently participating with AID? Which might be most beneficial and why?*

HOW TO CHANGE—PIECEMEAL APPROACHES

Introduction

Congress and aid organizations could make broad institutional changes to foster sound technology decisions. A second alternative would be actions to incrementally eliminate the constraints to sound technology decisions that are internal to the development assistance organizations. Such piecemeal approaches include:[8]

- relieve the overriding pressure to move money,
- improve project planning and ensure project flexibility,
- increase personnel motivation and accountability,
- hire enough of the right people,
- improve use of in-house expertise, and
- improve selection of consultants.

Relieve the Overriding Pressure To Move Money

Congress normally requires AID funds to be spent within one fiscal year. However, other approaches have been tried. For example, Congress has already has acted to make funds "available until expended" for the Sahel Development Program. Reportedly, the experiment has been only somewhat successful. Some agency personnel still believe that, even though unspent funds from the current year will not be "lost," the next year's funding is likely to be reduced by at least the unspent amount. Legislation has now been introduced to broaden the experiment by keeping other development assistance appropriations for Africa available until expended.

To reduce the force of AID's "spend the money" syndrome, Congress might have to complement such legislation by extending the budget cycle for development assistance. However, evaluation of this topic is beyond the scope of this paper.

Potential Oversight Questions:

- *How has keeping project funds available until expended affected project quality in AID's Sahel Development Program?*
- *Remembering that MDBs are banks, and that the first function of a bank is to assure timely return on its capital,*

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[8] The following potential changes in development assistance agencies are not presented in order of priority or as a suggested strategy. All seem likely to improve aid agency abilities to match technologies to the ecological conditions of development sites.

how does one manage the tradeoff between cautious decisionmaking and expediting the scaleup of technology interventions to get the flow of benefits started?

Improve Project Planning and Ensure Project Flexibility

Assistance projects that intervene in a developing country's natural resource base require careful and sometimes extensive planning. In most cases, the scientific knowledge base is from temperate regions while the development site often is tropical. For example, U.S. experts in soil and agriculture may be unfamiliar with the behavior of certain developing country soils or with local crops and cultivation practices necessary to ensure their satisfactory growth. Further, the recipient culture and economy tend to differ substantially from those of the project designers, making it difficult to predict what types of projects are likely to be adopted. Most development projects are, in part, experiments.

Projects that rely heavily on the technology/ecology fit, therefore, must be designed to accommodate expected but unidentified changes. Short project duration makes it difficult to introduce technologies or implement projects gradually, and presents a serious obstacle to making mid-term corrections in response to monitoring and evaluation. And, too, measurement of the project's ecological and social soundness may take much longer than AID's typical three- to five-year project allows. Where the research element of a project is particularly prominent, adequate project length is essential.

Risks to natural resource systems and development assistance recipients may be reduced where projects include an extended technical planning phase, a gradual phasing-in period for adaptation of technology to the site's ecological and social conditions, and a length commensurate with achievement of results despite mid-term project realignment. Yet, many constraints work against these approaches. Means to address these needs include:

- lengthened budgetary cycle and legislative language fostering improved project planning,
- increased investment in development of resource development planning techniques that can be used by project officers to ensure consideration of technology/ecology fit,
- increased projects with natural resource assessments and resource development plans as their goals, and/or
- longer project periods with gradual technology introduction and increased project monitoring fostering mid-term corrections in objectives and methods as necessary.

A major constraint to increasing investment in planning is the impatience of client country governments, the U.S. Congress, and other donor country institutions. Already, many developing country officials perceive development assistance project planning as too lengthy and costly. Such critics probably are not aware that the standards of haste common to industrial countries may be inappropriate in developing countries. The annual budgeting process further inhibits extended planning: the need to move money commonly requires that project planning be substantially shorter than one fiscal year, while determining ecological compatibility may require an understanding of natural system behavior over at least an entire cycle of seasons.

Similarly, contractors and aid organization staff are keenly aware of the urgency for each project to produce substantial, quantifiable results by the end of its period. Production targets stated at the beginning of three- to five-year projects often necessitate rapid scale-up of technology interventions and, therefore, major project realignments may be viewed as counterproductive. Further, managers of short projects cannot easily accommodate major unexpected changes in their projects. Instead of today's common three- to five-year AID projects, durations of 10 to 15 or perhaps 20 years seem more appropriate.

These problems exemplify the drawback of piecemeal approaches. If more projects were designed specifically to produce resource development plans for target areas but the plans do not become the basis for subsequent development assistance projects, nothing has been gained. Similarly, if projects were given longer periods for planning and implementation, but continued to move rapidly into fullscale operation and disallowed mid-term corrections, then damage from ecologically unsustainable technologies still might result.

Potential Oversight Questions:

- *What is the average length of your projects? are projects generally expected to be selfsustaining after this period? which kinds of projects are appropriate for gradual development and phase-in of technologies and which are appropriate for rapid scale-up of operations?*
- *What is the typical ratio of investment in project planning to investment in project implementation for various kinds of projects (agricultural, industrial, institution building, research, etc.)?*

- *What would be the advantages and disadvantages of increasing:*
  - *a) the general lengths of projects?*
  - *b) the ratio of project planning expense to investment in project implementation?*

Increase Personnel Motivation and Accountability

The World Bank and AID have few mechanisms to reward officers responsible for developing successful technology interventions, or to induce improved decisionmaking for those who have made poor technology choices. Project officers commonly move on to new projects or geographic regions prior to the termination of the initial project. This management problem will become more difficult, particularly in AID, as they shift increasingly to policy and economic support interventions where cause and effect may be obscure. In these, technology suitability is even less likely to become apparent before the officer responsible has moved out of range of accountability.

Nevertheless, the level of effort invested in developing information for sound technology decisions could be made a prominent feature in periodic personnel evaluations. The World Bank, AID, and other development organizations could experiment with methods for assessing quality of development work. Such factors could be given at least equal weight to quantity of tasks accomplished and total funds obligated in personnel evaluations. Determination of adequate criteria for evaluating and attributing development success, however, is problematic.

Individuals generally behave so as to perpetuate their bureaucratic unit. Thus, it should be possible to facilitate good technology decisions by monitoring the technology development success/failure ratio for the various bureaus, departments, and offices, and then by rewarding successful units of the bureaucracy, perhaps with increased funding.

The World Commission on Environment and Development has recommended that periodic accounting of natural resource conditions and environmental quality indicators accompany reports of host country economic indicators prepared by development assistance organizations. This could provide a way to motivate the development assistance community to address the match of technologies with ecological conditions more carefully.

Potential Oversight Questions:

- *How is quality of work weighed against quantity of tasks accomplished in your personnel evaluation procedures?*
- *How does your project evaluation procedure give feedback to a reward/accountability system that gives officers or offices credit or blame when projects are or fail to be sustainable?*

Hire Enough of the Right People

Development organizations need to include increased numbers of staff trained and experienced in the development and management of natural resources as well as staff with expertise in the techniques of environmental analysis. This conclusion has been stated repeatedly at Congressional hearings. Gradually, the aid organizations have responded. Most of them now have some foresters and ecologists or environment planners in positions that employ their technical expertise. Still, most aid organizations seem to add environmental professionals only in reaction to outside pressures. A substantial part of new personnel could be selected from people having demonstrated expertise in natural resources development or environmental analysis at the direction of high-level AID and MDB management. The continued low numbers of such experts on agency staffs indicate that their importance is not yet appreciated by high-level agency personnel.

Currently, development assistance organizations rely on consultants and contractors for nearly all technical expertise needed to develop sustainable projects. Meanwhile, evidence favors hiring and placement of natural resource and social science experts where they will form development strategy, identify project, program, and policy interventions, and support project implementation and evaluation. Each development organization could analyze its past evaluations and project records to obtain clearer evidence for or against this proposition.

Potential Oversight Questions:

- *Over the past decade, what has been the trend of the ratio of numbers of positions for technically trained staff to numbers of positions for generalists in your organization?*

- *What evidence exists, or could be developed, to indicate whether your organization's current reliance on consultants for technical expertise is sufficient for successful development assistance operations?*
- *What is your organization's current policy on recruitment and hiring of personnel with training and experience in natural resource sciences versus personnel with training in economics?*

Improve Use of In-House Expertise

The World Bank and AID operate in countries having a wide variety of cultures and environments. These organizations regularly rotate personnel among country and regional assignments to foster broad experience and career development. Few officers probably would be satisfied with an entire career tied to one country.

Concurrently, however, the AID rotation system constrains development of in-depth staff expertise on the cultures, languages, and environments of the recipient countries. This is compounded by lack of incentives for staff to investigate local people's knowledge of development opportunities and constraints, by heavy bureaucratic workloads, and by project funding procedures that inhibit staff participation in field activities.

The MDBs and AID have staff who have technical knowledge developed through academic training, professional experience, and self-education. Considerable knowledge—particularly regarding ecological conditions—remains relevant long after staff have rotated out of an assignment. Yet these people often are placed in positions which make little use of their expertise.

Without abandoning the rotation system, procedures for assignment of personnel could be adjusted to facilitate improved use of existing in-house technical expertise. For example, computer database techniques similar to those used to manage consultant rosters could be used to match staff technical backgrounds to agency assignment opportunities.

Further, AID and the World Bank could improve project design by developing in-house review boards made up of personnel experienced in the given geographic area. At present, few officers are called on to assist in designing projects that will be implemented at their previous posts. Some of these individuals probably would be interested in tracking proposed new projects and serving as a member of ad hoc review boards. Abstracts of proposed new projects could be sent to the boards for critical evaluation of likely impacts. Their reviews would be used by project officers to confirm or revise their technology choice. Through such a procedure, in-house expertise could be expanded without adding new positions. However, in AID at least, this is unlikely to be feasible without broader changes to streamline project design procedures and reduce agency workloads.

Potential Oversight Question:

- *Recognizing the good reasons for rotating staff among country assignments, how do your organization's assignment and communication procedures assure best use of the technical and geographic area expertise of your staff?*

Improve Selection of Consultants

Donor agency consultants and personnel of host country organizations probably will continue to provide most of the technical information and technical decisions for project design, implementation, and evaluation, even with expanded in-house expertise. AID consultants commonly are recruited in the United States or other industrialized countries. However, U.S. academic and government institutions generally have not encouraged development of expertise relevant to tropical developing countries. Similarly, consultants experienced in managing interdisciplinary teams to analyze development problems and interventions are scarce. Consequently, the combination of developing country experience and interdisciplinary technical expertise is rare; recruiting technically competent consultants for such teams will be difficult.

Therefore, it seems appropriate for the MDBs and AID to focus a significant part of their in-house training on methods of interdisciplinary analysis. AID has supported programs in U.S. universities and other institutions to develop in-house expertise relevant to its needs. For example, AID/S&T Forestry, Environment, and Natural Resources Office has supported development of interdisciplinary planning methods at the International Institute for Environment and Development and elsewhere, and has held seminars to train in-house staff in their use. Other S&T Offices similarly could increase support for development of interdisciplinary expertise. This might be particularly relevant to the Bureau's Agriculture office as part of its new focus on conservation of agriculture's natural resource base.

A longer-term approach may be to increase the pool of U.S. technical expertise in the development and management of tropical resource systems. For example, certain Land and Sea Grant institutions are located in tropical U.S. areas and conduct research and development activities relevant to tropical developing countries. However, these institutions are few and generally have small numbers of personnel and financial resources for such research. Development of a significant tropical component in other such institutions could increase the pool of U.S. experts from which development organizations could choose consultants, and concurrently assist resource development efforts in tropical U.S. areas. Congress could explicitly identify development of tropical resource system curricula in certain Land and Sea Grant institutions as a goal, perhaps in the Foreign Assistance Act. Additional institutions that have developed specialized programs related to temperate resource systems may be induced to follow this example and enhance their own curricula in tropical resource development and management.

HOW TO CHANGE—HOLISTIC APPROACHES

Introduction

Budget cuts, declining technical staff, shifting priorities, and a proliferation of congressional mandates may adversely affect the likelihood of development successes. Thus, without clear expression of Congress' recognition of the importance of matching technologies to local conditions, piecemeal efforts may have only short-term beneficial effects.

Make Technology/Ecology Fit an Expressed Priority

Congressional concern about transfer of inappropriate technologies can be expressed in new or modified legislation, and at hearings convened for oversight, authorization, appropriation, or confirmation. Through these mechanisms, Congress can identify ecological compatibility as a priority, or even a necessity, for U.S. development assistance efforts. To improve the effectiveness of this guidance, it may be necessary to provide some clarification, ranking or consolidation of the other myriad priorities in development assistance expressed by Congress.

Congress often can stimulate improvements in development organizations' handling of issues such as technology selection without creating new legislation. Informal meetings between Members and AID or MDB officials and followup cooperation between congressional and agency staff, reportedly had an important role in the changes in development assistance priorities that occurred during the 1960s and 1970s. This kind of cooperation seems less common today.

A goal of identifying the ecological attributes of a recipient country and basing selection of development assistance interventions on those established parameters could be specifically identified in the Foreign Assistance Act. Such a measure would definitively establish integration of environmental considerations into development assistance efforts as a priority.

Legislation and congressional views strongly expressed at hearings certainly affect priorities in the development agencies. But these priorities are likely to be internalized only if they are views shared by the heads of the agencies. Actions and decisions of high-level agency officials, particularly AID's Administrator and Assistant Administrators, may bring about changes affecting the entire agency. Many past AID Administrators have not had backgrounds that equipped them to recognize the importance of the links between technologies and developing country ecological settings. Thus, confirmation hearings provide an important opportunity for Congress to raise issues and to discern the depth of a nominee's knowledge of and concern for matching development projects and technologies to local conditions in developing countries.

It is during these confirmation hearings that the candidate is first exposed to congressional concerns that relate to his/her new responsibilities, and also a time when he/she may be looking for new ideas. Thus, confirmation hearings are an appropriate place to reinforce the guidance given in oversight hearings and in legislation. Questions at confirmation hearings can indicate clearly what Congress will expect from him/her later on. Similarly, it is a time when Congress can assess the likelihood of its concerns being addressed, should the official be confirmed.

Encourage Research and Cautious Innovation

Even under optimum conditions, development problems are difficult to solve. To find ways to improve the fit of technologies to local conditions, Congress could encourage the AID Administrator to support related research, and to foster innovation and experimentation in cases where sound theory and gradual implementation can protect technology recipients from the consequences of failure. Experiments would, of necessity, be small scale activities such as on-farm research and demonstration and would be carefully monitored until their suitability for expansion is clear.

Such small efforts, in aggregate, could have considerable impacts. Today, fewer U.S. foreign assistance dollars are assigned to development assistance activities than in past years. However, international development institutions monitor the activities of similar institutions and, where successes occur, they commonly copy them. Therefore, if U.S. supported development assistance were to take a clear leadership role in assuring that technologies fit developing country ecological settings, even these diminished funds could have a far reaching impact on other organizations conducting development assistance activities.

Restructure Technical Resources

A key factor in assuring that development assistance promotes ecologically sustainable technologies is effective use of the technical staff with professional training, experience, and interest in applying technology to developing country needs. Although AID and World Bank have such people, they do not seem sufficiently integrated into all aspects of development assistance (e.g., problem definition, project design, implementation, evaluation and redesign) to assure the highest development project success to failure ratio. This seems particularly true for those projects which involve technology transfer to address developing countries' environment and natural resources problems and opportunities.

Notwithstanding, AID may have the technical staff collectively in its Missions and in Washington to increase its overall successes. If AID were to concentrate its knowledge on the various ecological settings in developing countries and on matching technologies to these settings, it seems likely that the physical and biological conditions necessary for sustained development could be maintained. AID could accomplish this by developing in-house, interdisciplinary specialist teams to help screen host country problems and AID-proposed solutions, and to assist field staff in locating technical assistance appropriate to the recipient country's ecological characteristics.

One possible categorization of developing country ecological zones in which AID and the MDBs operate is 1) hot wet lands, 2) arid/semiarid lands, and 3) high altitude lands. Although differences obviously exist between the environments and resource systems within these zones (e.g., the Brazilian rainforest is somewhat different than Zaire's rainforest), they are similar enough that technologies compatible with the environment of a given ecological zone are likely to be sustainable when adapted for the same zone in another area. (Of course, political, cultural and economic factors may vary greatly among between areas, potentially rendering technologies incompatible in other ways.)

These ecological teams should include, for example, participation of other technical specialists like agronomists, soil scientists, foresters, hydrologists, anthropologists, geologists, geographers, and ecologists. Grouping AID personnel in this fashion would have the immediate beneficial effect of linking specialists in a close working relationship (e.g., agriculturalists with other environment/natural resource specialists), thus resolving a well-identified communication problem.

A fourth team or office with expertise that overlaps the three ecological zones, such as engineers, economists, health specialists, educators and demographers, would work with the ecological teams on projects. This fourth team would take the lead on technical design and evaluation projects unlikely to have strong interactions with the natural resource base (e.g., projects to improve text books for primary education).[9]

AID could assemble teams from AID/S&T[10] technical staff having appropriate professional training, experience, or interest in the various aspects of natural resources and environment in each ecological zone. So, for example, an agronomist from this Bureau having professional training in dryland agriculture could become part of the team on arid/semiarid lands; a geographer having many years of experience in Guyana and the Philippines could join the hot, wet lands team; and a new staff member with a general background in hydrology but a strong interest in erosion control might move into the high-altitude lands group.

Where certain specialties might be missing, AID could draw qualified persons from regional bureaus, or from Mission staff. Such an arrangement might not require additional AID staff if agency personnel were screened carefully for their appropriate professional training, experience and interest. However, these offices should not be depleted of technical specialists or environmental analysts. A hiring policy aimed at filling vacancies in each ecological team as well as maintaining basic strength in regional bureaus and Missions could mitigate potential staffing deficiencies.

Ecological teams could serve as environment/natural resource filters for all proposed projects coming in from the field or arising in AID Washington (figure E-3). Each ecological team could examine mission-identified problems and assist in project response development, or review previously prepared plans for their suitability to the development site conditions. The team also could help Missions identify relevant outside technical expertise and technologies with a strong likelihood of fitting the local environmental conditions and, thus, of achieving the development goal.

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[9] An additional team, less directly related to issues of ecological compatibility, might specialize in projects relevant to urban problems and opportunities.

[10] Some technical specialists view this Bureau as having the largest number of technical staff with the greatest number of years of relevant experience.

The ecological teams (perhaps within a reorganized Science and Technology Bureau) also would be in direct line between the Missions/regional bureaus and U.S. technical expertise (e.g., universities, private sector, PVOs/NGOs, and executive agencies' technical resources) further assuring that AID would be unlikely to select and transfer unsustainable technologies to developing countries. Although AID and MDBs structures differ, such teams could fulfill a similar function in MDBs, operating as a "technical filter" between bank regional technical departments and outside technical resources.

This restructuring might be strongly resisted by AID management or the Foreign Service Union because it would require a significant reorganization of AID technical staffs. If this reorganization became untenable, the ecological teams could be implemented (perhaps on a simplified level) in each geographic bureau.

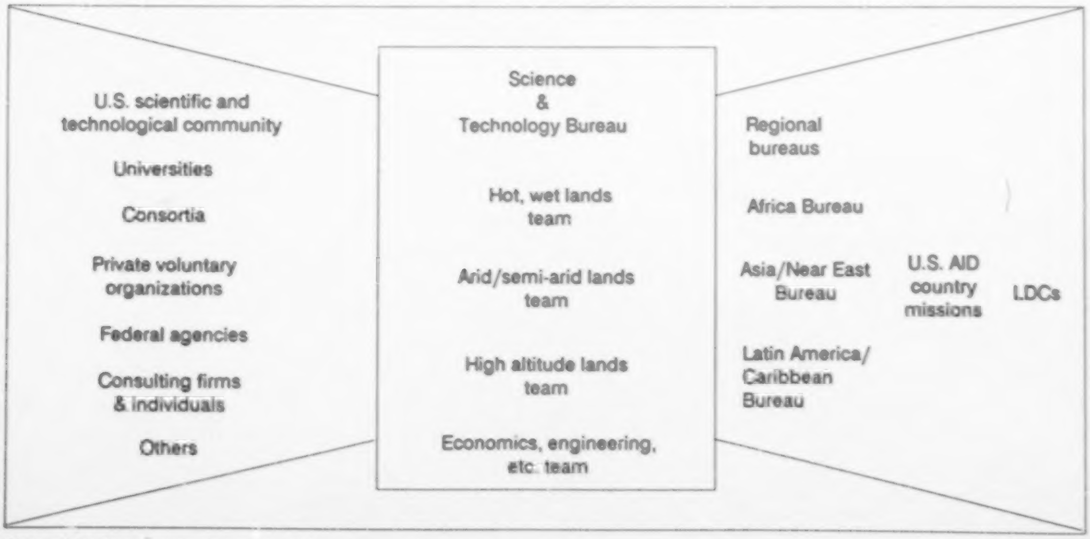
Suggested Oversight Questions:

- *What do you see as advantages and disadvantages of organizing your technical staff into interdisciplinary teams with separate teams for each major ecological zone?*
- *Please provide a listing of existing personnel with technical qualifications for these ecological teams. Please indicate technical areas for which no qualified personnel are currently available.*

Strengthening Technology Selection Expertise

Increasing developing country capabilities to determine which technologies will fit their own particular ecological setting probably will do more to foster sustainable development activities and help to stem degradation of their natural resources than simply having development assistance agencies ensure the ecological compatibility of technologies used in development assistance projects. AID/S&T, eight years ago, began a few special projects to assist Mission and bureau staff as well as developing country planners and natural resource specialists to im-

Figure E-3—Simplified Diagram of Proposed Restructuring of AID Technical Resources


U.S. scientific and technological community
Universities
Consortia
Private voluntary organizations
Federal agencies
Consulting firms & individuals
Others
Science & Technology Bureau
Hot, wet lands team
Arid/semi-arid lands team
High altitude lands team
Economics, engineering, etc. team
Regional bureaus
Africa Bureau
Asia/Near East Bureau
Latin America/ Caribbean Bureau
U.S. AID country missions
LDCs

SOURCE: Office of Technology of Assessment, 1987.

prove their understanding of interactions between technology and ecology. These projects led to the creation of Country Environmental Profiles (CEPs).

CEPs describe the status of a country's natural resource base and associated problems and potential opportunities for development of the resources. They are used by specialists from developing and developed countries alike in project and strategic planning.

CEPs involve several stages of writing, review and rewriting. Phase-one profiles are desk studies prepared by U.S. experts mostly through library research, followed by Phase-two reports that are supported by AID but largely prepared by host-country experts using outside expertise when necessary. Fifty Phase-one versions are complete; one-fifth as many Phase-two profiles exist. The process provides an opportunity to improve the knowledge base of AID staff, contractors, and host-country counterparts, as well as to increase and strengthen the analytical skills and involvement of developing country environmental/natural resource experts.

Additional AID projects produced comprehensive, individual reports on various ecological settings common to many developing countries; several of these have been published in book format. The reports were produced primarily by teams of U.S. environment/natural resource experts and included separate analyses on: the humid tropics, arid/semiarid lands, the coastal zone, environment/natural resource planning methods, and case studies of development technologies drawing directly on the natural resource base. Generally, these reports were intended for use by AID bureau and Mission personnel involved with project design. However, followup training associated with certain topics has been held in developing countries. In addition, experimental computer models were investigated that might facilitate natural resource and environmental planning and research definition in developing countries. Such efforts by AID and cooperating agencies are important in the process of improving the fit of development technologies to particular ecological settings.

These efforts, though small in comparison to AID's overall activities, address congressional concerns about matching technologies to developing country environments. However, since these are individual projects, they have a defined lifetime. Yet, learning to link the most appropriate technologies to the local ecological conditions of development sites is certainly an ongoing process for U.S. development assistance agencies as well as for developing countries themselves. Expanding, strengthening and building such activities into the ongoing development process rather than dealing with them as finite projects may be a promising opportunity to improve technology/environment linkages.

Suggested Oversight Question:

- *What efforts has your agency made to strengthen technology selection expertise? What results have been obtained? What further actions are being planned?*

WORKSHOP PARTICIPANTS AND PERSONS INTERVIEWED[11]

Workshop Participants

David Bathrick
U.S. AID/S&T/AG

Peter Freeman
Consulting Geographer
Alexandria, VA

John Gaudet
Regional Office for Eastern
and Southern Africa
U.S. AID
Nairobi, Kenya

Molly Kux
U.S. AID/ST/FNR

Stephen F. Lintner
U.S. AID/ANE/PD/ENV

Christopher Russell
U.S. AID/S&T

Bob J. Walter
Department of Geography
Ohio University
Athens, OH

Persons Interviewed

Steven Berwick
International Institute
for Environment and Development

Robert O. Blake
International Institute for
Environment and Development

Warren Brockleman
Mahidol University
Bangkok, Thailand

Kjell Christophersen
International Resources Group

Jon Clark
Environmental and Energy Study Institute

John Cleave
World Bank

Diana Crowley
World Bank

Paul Lightfoot
Thai Bank for Agriculture and Cooperatives
Bangkok, Thailand

Andrew McGuire
World Resources Institute

Kathleen McNamara
World Bank

William J. Nagle
World Resources Institute

Raymond Noronha
Consulting Sociologist
Alexandria, VA

J. Kathy Parker
Office of Technology Assessment

Steve Parcells
Natural Resources Defense Council

Sheridan Pluckett
U.S. AID

Mit Pramuanvorachat
U.S. AID

Bert Printz
Neill & Co.

Bruce Rich
Environmental Defense Fund

Jeff Romm
University of California
Berkeley, CA

Richard Saunier
Organization of American States

Stephen Schwartzman
Environmental Defense Fund

Ben Severn
U.S. AID

Chamlong Tohtong
Thai Bank for Agriculture and Cooperatives
Bangkok, Thailand

Jeremy Warford
World Bank

Paul Weatherly
Biomass Users Network

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[11] Unless otherwise noted, the listed institutions and individuals are located in Washington, DC.

Francis Weber
National Audubon Society

Phyllis Windle
Office of Technology Assessment

David Wirth
Natural Resources Defense Council

Montague Yudelman
World Resources Institute

Appendix F

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Appendix G
Contracted Papers

The Aid-University Partnership: Supporting Long-Term Links With LDC Agriculture and Natural Resources Universities and Research Institutions
Larry Apple
North Carolina State University

The Role of U.S. Universities in Development Assistance: Technical Support for Natural Resources and Environment
Len Berry
Florida Atlantic University

University-International Agriculture Research Center Links
Robert Bertram
Bureau for Science & Technology
U.S. Agency for International Development

University-Private Consulting Firm Cooperation in Development Assistance
Scaff Brown
Chemonics Corp.

University-University Linkages in International Development
Jim Collum
Consortium for International Development

The Relevancy of Training/Education of LDC Students at U.S. Colleges & Universities in the Fields of Agriculture, Natural Resources, and Environment
Don Dweyer
New Mexico State University

Possible Responses of U.S. Universities to Sustainable Agriculture as a Development Assistance Goal
Clive Edwards
Ohio State University

Opportunities for Expanding University Development Assistance Programs Beyond USAID
Bill Flinn
Midwest University Consortium for
International Agriculture

University-Agribusiness Cooperation in Development Assistance
LaVern Freeh
Land O'Lakes, Inc.

The Role of U.S. Universities in Development Assistance: Implications for Internationalization of Universities
Jim Henson
Washington State University

Networking Agriculture and Natural Resources Universities and Research Institutions in Developing Countries
Bruce Koppel
East-West Center

Integrating Gender Issues in Agriculture and Natural Resource Development: Implications for Universities Engaged in Foreign Assistance
Kathy Parker
The Oriskany Institute

University-PVO Cooperation in Development Assistance
Darl Snyder
University of Georgia

The Role of U.S. Universities in Development Assistance: Lessons From AID-University Program and Project Evaluation
John Stoval
Consultant

U.S. Universities and Constituency Building for Development Assistance for Foreign Affairs
Robert Stowe
Citizens Network

U.S. Universities and Development Assistance: Role of USAID-University Partnership
Woods Thomas
Purdue University

An Assessment of Title XII of the Foreign Assistance Act
E.T. York
University of Florida (emeritus)

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